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JOURNAL AND INTERNATIONAL
# PLASTICS

One shilling WEEKLY

VOLUME 140 NO. 6 FEBRUARY 11 1961

Some of the range of bottles moulded from 'Alkathene' I.C.I. polythene by Blewis & Shaw (Plastics) Limited, Lower Ham Road, Kingston-on-Thames, for Avon Cosmetics Limited, a subsidiary of Avon Products Inc., New York.


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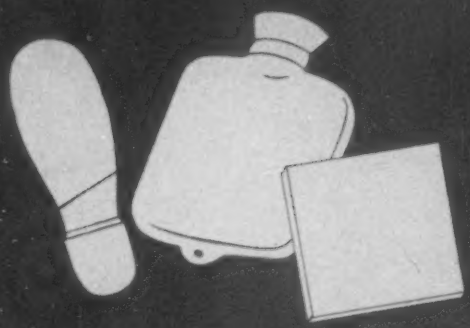
A11

# SELECT A NAUGATUCK ANTIOXIDANT



## OCTAMINE

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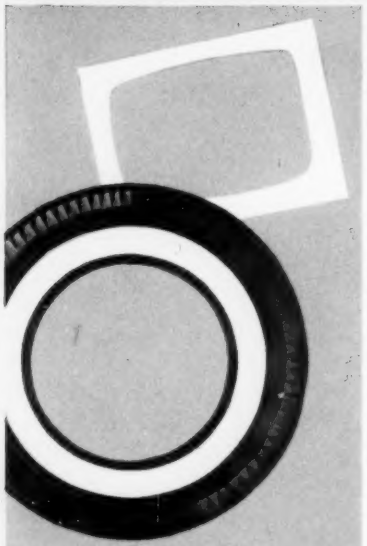

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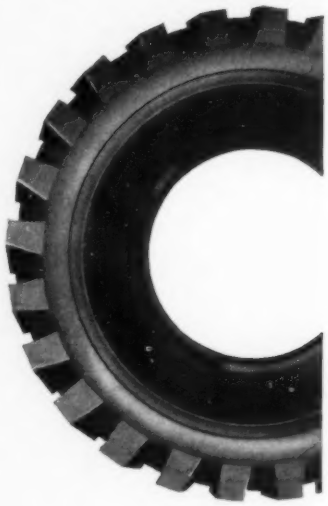

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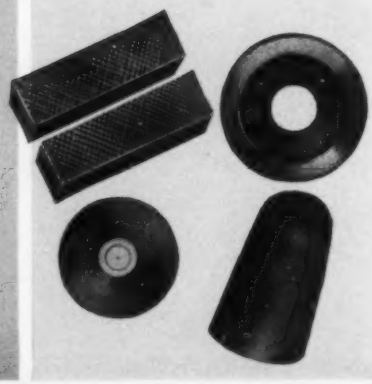

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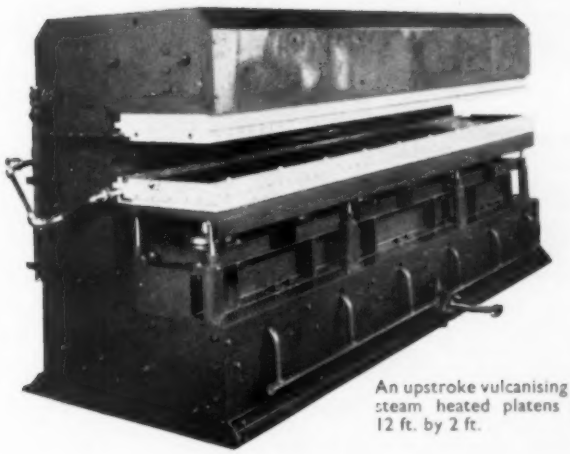
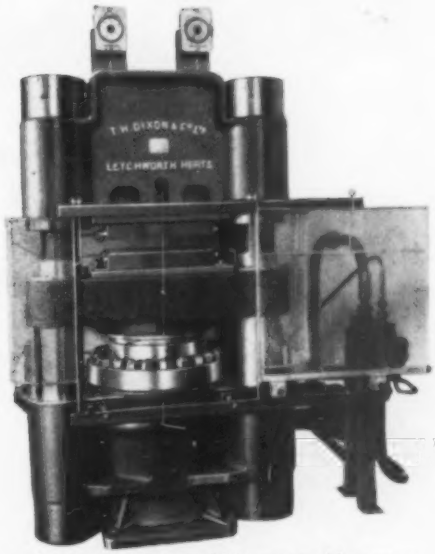
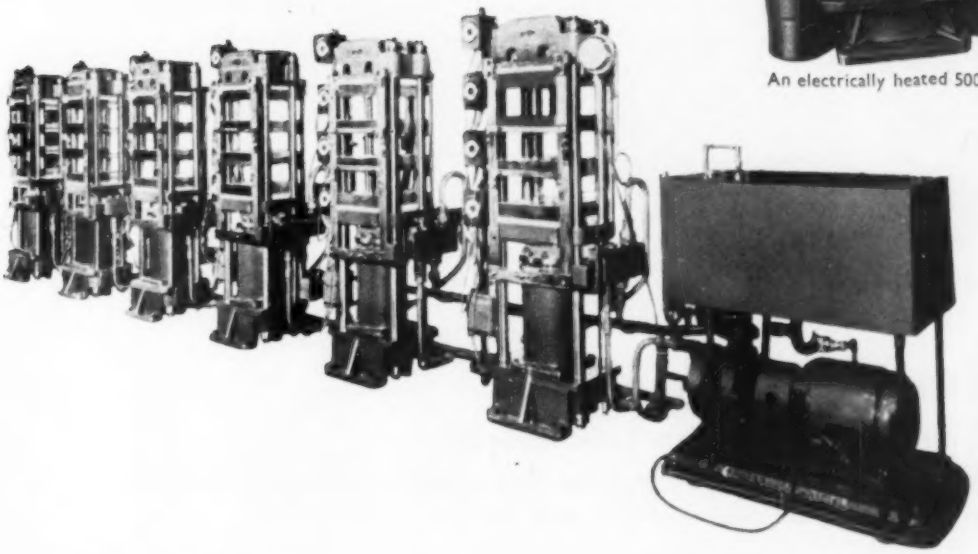


An upstroke vulcanising press with steam heated platens measuring 12 ft. by 2 ft.



An electrically heated 500 ton moulding press.



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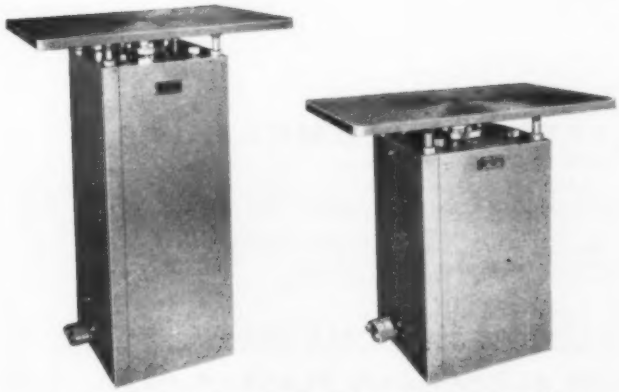

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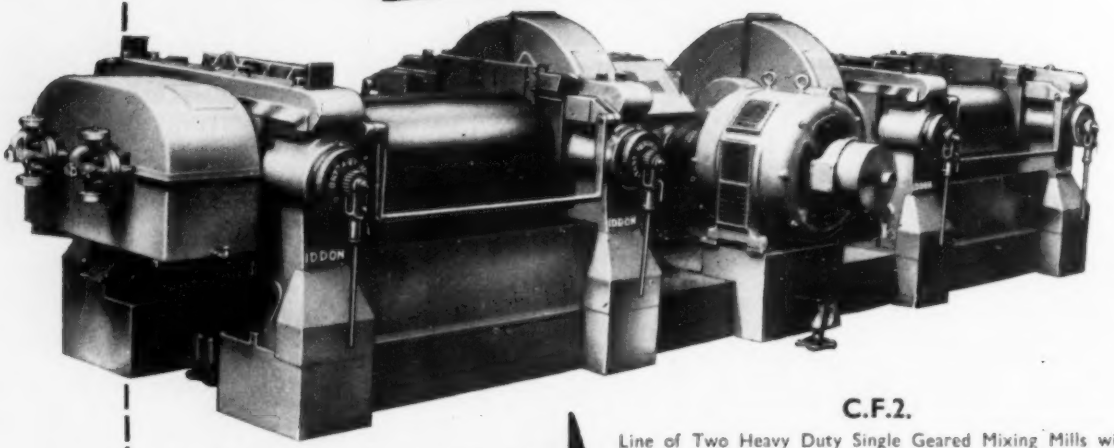

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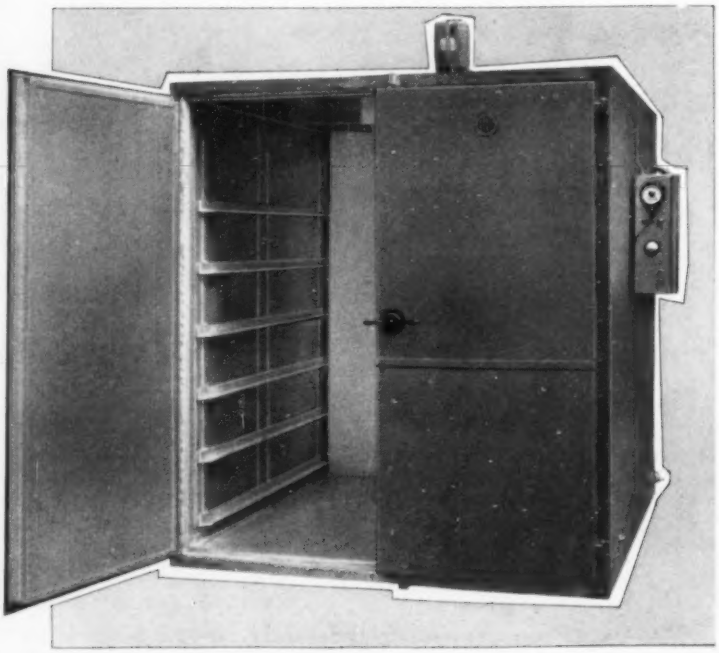

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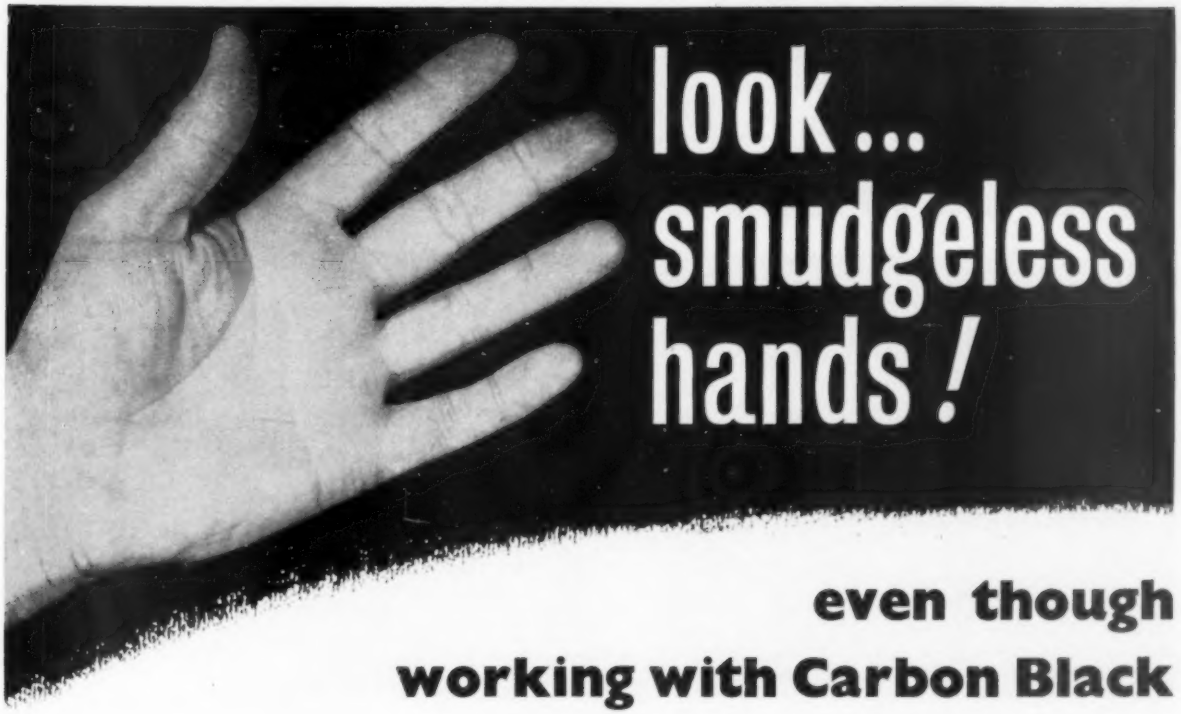


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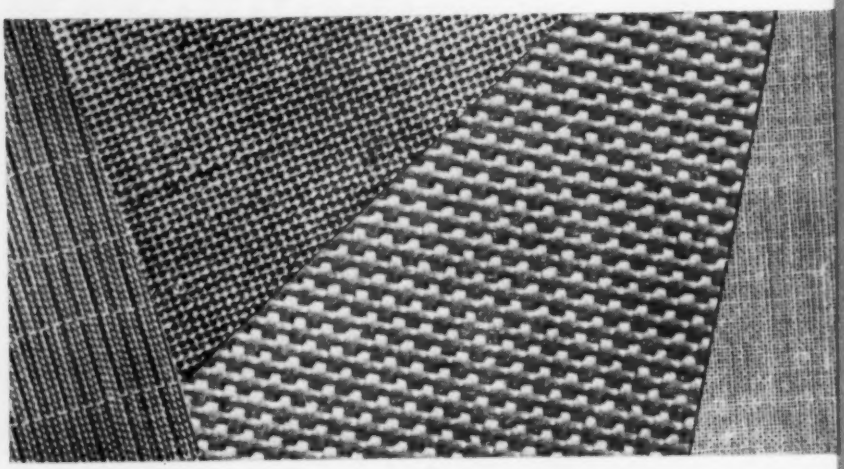

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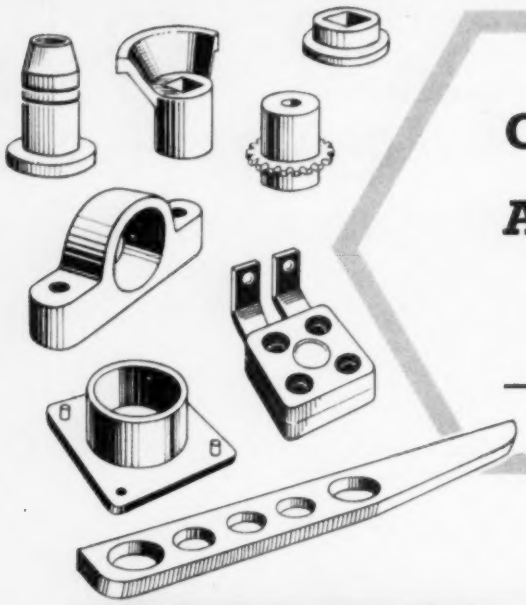

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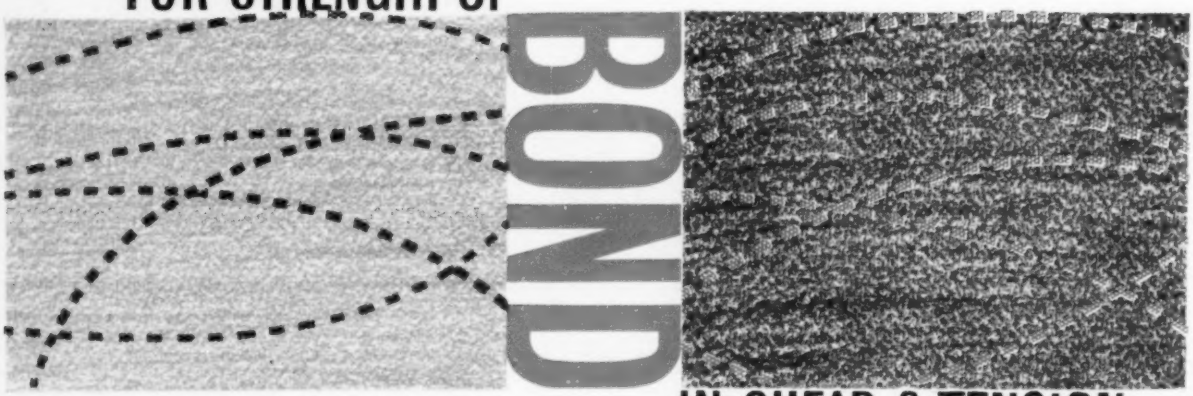

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One shilling WEEKLY

**Volume 140** *IN ITS 77th YEAR* **No. 6**

**February 11 1961**

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# NOTES of the WEEK

## *Attitude Surveys*

WHEN a business is not functioning properly it is often very difficult to find out exactly what is wrong. The effects—inefficiency, a bad 'climate' in office and works—are only too plain; the causes are frequently hidden in the complex structure of the business. An organization that has been digging out these causes for a good proportion of its 40 years' existence is the National Institute of Industrial Psychology, whose annual report was published last week. The Institute—whose founders, incidentally, included H. J. Welch, a director of Harrisons and Crosfield Ltd.—reports further progress with 'attitude surveys.' In these surveys a member of the Institute's staff interviews a proportion of the management and employees and tries to find out what they think is wrong with the organization, and how they think improvements can be made.

One example of the Institute's work in this field is a survey carried out in a plastics engineering company, This showed that most of the staff and workers thought that the factory routines were too lax. Complaints were made about 'clock watching,' excessive time for washing, poorly finished work and a general failure to administer reprimands or praise when deserved. As a consequence of the survey the company, to the satisfaction of its more conscientious workers, gradually tightened up discipline, with gratifying results.

There is need for more work of this kind, and for more understanding of it—and not only from an altruistic point of view. Just as it pays to have regular maintenance of machinery, so it makes commercial sense to maintain good human relations. And, as the NIIP surveys show, good intentions are not enough. An attitude survey sometimes reveals to management that a certain policy may be resented by employees, even though it has been adopted for their benefit. In fact, as the NIIP report points out, it is not what the truth is, but what man thinks it is that governs his actions.

## *Packaging Prosperity*

THE packaging industry is a large consumer of plastics, and through its rapid expansion has contributed to the quick growth of the polymer industry. In 1953 it was estimated that British industry spent over £300m. a year on packaging its products; by the end of last year this estimate had risen to some £600m. In these exhibition-conscious days the prosperity of an industry can be gauged by looking in its shop window. A glance at the International Packaging Exhibition will show that the organizers have had to put in several new windows. It has just been announced that this year's exhibition (the seventh), which will be held at Olympia in September, will occupy four times the area of the first.

The 1959 exhibition saw the introduction of a great deal of new and interesting equipment, particularly on the blow-moulding side. Advance information promises that this year's exhibition should be just as interesting on the equipment side, with developments in wrapping and sealing equipment, in printing processes and with the probability of a number of Italian and German machines on show for the first time.

Although new materials do not occur with the same frequency as package constructions and new types of equipment, new grades and even new thicknesses exhibited can be significant, enabling an existing job to be done more cheaply or more efficiently. And then, of course, there is polypropylene. It is difficult to say what stage the UK marketing development of polypropylene film will have reached by September, but it may well prove to be the outstanding feature of the show.

## *Tyres and Safety*

TODAY, large commercial concerns manufacture more than their products. They produce a number of ancillary services which add to the value of the product and which are often worth a good deal in themselves. The tyre manufacturers are an excellent example of this: in the worsening traffic conditions of today they sell safety as well as tyres.

India Tyre and Rubber Co. Ltd. has produced a booklet called *Safer Driving*, based on a number of leaflets which it has been distributing for some years. The booklet includes a special section on motorway driving and is being distributed free. It is not simply an advertising device: it expresses very lucidly what a driver may feel and yet never describe to himself very clearly. How would you describe a skid, for example? The booklet gives a neat, deceptively obvious description: 'Any driver who has experienced a skid will realize that he was changing either his speed or his direction immediately before the skid developed. From this it appears that skidding is usually caused by accelerating, braking or changing direction so suddenly as to create forces more powerful than the grip between the tyres and the road.' Descriptions of this kind help the driver to understand what his tyres can and cannot do. The rubber industry can be proud of what the tyre manufacturers are doing for road safety. They are not only making sure that their products grip the road; with publications of this kind they are helping to keep their customers' minds on it.

# NEWS *Briefs*

CYANAMID IN BRAZIL — TREES ACROSS AFRICA
GSA STOCKPILE SALES—FRENCH BUTYL PLANS
BERLIN PROTOCOL — CELANESE $12m. PROJECT

●**West Germany** — Production of butadiene has been started by Erdoelchemie GmbH, a company owned in equal parts by Farbenfabriken Bayer AG and BP Benzine und Petroleum AG. The company's plant is said to have an annual capacity of 30,000 tons of butadiene.

●**United States** — Celanese Chemicals, division of Celanese Corporation of America, is to build a plant in Bay City, Texas, to make acetaldehyde and 2-ethyl hexanol. Trade sources indicated that the plant will cost upwards of $12m. It will have a capacity of 100m. lb. and will use an ethylene oxidation process licensed from Aldehyd GmbH, a company owned jointly by Farbwerke Hoeschst and Wacker Chemie of West Germany. Construction of the new plant will begin in the second quarter of this year and should be completed within a year.

●**Australia** — Imperial Chemical Industries of Australia and New Zealand and Broken Hill Proprietary are to expand production of napthalene and phthalic anhydride under a programme costing over £1m.

●**United States** — The General Services Administration has announced that January sales of crude natural rubber from the national stockpile, including transfers to other Government agencies totalled 777 long tons. The total sold under the current disposal programme has now reached 98,648 long tons.

●**Rhodesia** — Rubber trees from West Africa are to be imported into the Federation of Rhodesia and Nyasaland to boost output at the country's only rubber plantation at Nkata Bay in the Northern Province of Nyasaland. The plantations first rubber trees were imported from Ceylon about 50 years ago. Today the plantation has over 75,000 trees producing some 300lb. of rubber per acre annually.

●**Australia** — Taxi-drivers in Sydney are switching to Japanese tyres following the refusal of local manufacturers to allow discounts. An official of the Metropolitan Taxi Council stated that the Japanese tyres cost £A8 8s. for tubeless and £A7 4s. 6d. for the conventional type, compared with £A10 0s. 6d. and £A8 17s. 6d. for Australian brands.

●**Brazil** — The US Cyanamid Company has bought Plásticos do Brasil S.A., of Sao Paulo, for $2m. The Brazilian company will go under the name of Formica Plasticos S.A. An increase in production of laminated plastics is envisaged.

●**United States** — In Beaumont, Texas, Goodyear Tyre and Rubber Company chairman said that his company will spend $80m. on new plant and equipment making an increase of $5m. over 1960 expenditures. He said that the Beaumont synthetic rubber plant, scheduled to be opened this autumn by Goodyear, will have a capacity of 40,000 tons.

●**East Germany** — A protocol has been signed in Berlin providing for scientific co-operation between the Academies of Sciences of the USSR and Eastern Germany this year. The programme is said to include discussion of a number of petrochemical problems.

●**India** — Nahorkatiya, in the hilly north-east Lakhimpur district of Assam, will become the centre of natural gas based industries in the state during the next five years. The gas will be used for generating electricity and for various industrial undertakings, including a synthetic rubber and a carbon black plant. The synthetic rubber plant will cost 150m. rupees and produce 20,000 tons per annum. The carbon black plant, estimated to cost 10m. rupees, will produce 10,000 tons per year.

●**Italy** — Mobiloil Italiana, the Italian subsidiary of the Socony Mobil Oil Co., has established a new company called Mobilchimica Italiana. This company will build a petrochemical plant near Naples which is expected to go on stream late in 1962. Products will include benzene, ethyl benzene and ortho- and para-xylene. Initial capacity will be 150,000 tons.

●**France** — Société du Caoutchouc Butyl — SOCABU — has announced 20,000 tons and is also studying the that in 1960 production of butyl rubber totalled 17,515 tons of which 10,452 tons came in the second half of the year. Last December, it was added, output exceeded 2,000 tons. Exports accounted for 43.4% of total sales. This year the company hopes to exceed the nominal capacity of possibility of raising it.

*'That's a helluva way to treat a set of tyres!'— 523*

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# IRI International Conference

## FOURTH ON RUBBER TECHNOLOGY TO BE HELD IN 1962

THE Institution of the Rubber Industry is to hold its Fourth Rubber Technology conference at Church House, Westminster, London, from May 22-25 1962.

The conference will be international in character and it is expected to be attended by between 750-1,000 delegates.

It will be in four main sections:

(1) Latex Science and Technology.
(2) General Rubber Technology — equipment, processing, compounding and evaluation.
(3) Rubber Science — chemistry, physics, testing, analysis.
(4) Materials and Products — rubbers, textiles and ingredients.

**New Materials Exhibition**

The papers will be available to conference members as pre-prints and each author will be given 10-15 minutes to summarize, in order to leave ample time for discussion. A large number of papers will be presented by UK delegates, and present indications are that delegates from 11 other countries will also present papers.

Consideration is also being given to an Exhibition of New Materials and Testing Instruments, which would take place at the same time and would also be held at the Church House, Westminster.

*RJIP* will be covering the event with a special conference number which will contain details of speakers and papers — it will also contain flashbacks of the first IRI Rubber Technology Conference which was held in 1938.

*More IRI News on page 226*

## CZECH SHOE FACTORY BUYS BRITISH

Simon Handling Engineers Ltd. has been awarded a contract by Strojimport for the supply of automatic proportioning equipment for ingredients used in the manufacture of rubber for footwear by Svit np. of Gottvaldov, Czechoslovakia. This equipment, probably the first of its kind in Czechoslovakia, will introduce closer process control and reduce manpower requirements by the elimination of manual weighing and feeding of ingredients to the mixing machinery.

The value of the contract is more than £60,000, and the completed order is to be shipped early in November 1961. The company says that it was won in the face of severe international competition.

Svit np. is said to be the second largest shoe factory in the world and turns out approximately 183,000 pairs a day.

## Porous Agents

Porous Plastics Ltd., which was formed last year to handle the manufacture and marketing of 'Vyon' porous high density polythene, has recently appointed its first two overseas agents. They are The Guardian Chemical and Equipment Co. Ltd., P.O. Box 392, Station 'O,' Montreal 9, P.Q. Canada, and Industrial Composizioni Stampate, Via Gaustalla 2, Milan (241), Italy.

## Baker Perkins Rights Issue

Plans to raise £3m. by a rights issue of ordinary shares and a debenture placing have been announced by Baker Perkins Ltd.

These issues are being made to refinance the purchase of a number of businesses during the past year, including Rose Brothers (Gainsborough) for which the offer made last month has now been accepted for the whole of the capital.

The rights issue is of 871,296 £1 ordinary shares at 36s. each on the basis of seven shares for every £25 ordinary stock held on January 24.

## Durapipe Destroyers Order

An Admiralty contract for extruded high impact PVC piping and moulded fittings has been placed with Durapipe and Fittings, of West Drayton, Middlesex, for pre-wetting installations in four guided weapon destroyers now under construction.

## Craxford Becomes Viking Plastics

CRAXFORD Mouldings Ltd., manufacturers of a wide range of plastics products and components for consumer and trade markets, has changed its name to Viking Industrial Plastics Ltd.

This move, the company says, represents a further step in the current development and rationalization plan within the Viking group of companies of which VIP is a member. The structure of the board remains unchanged: the chairman is R. D. Cole and his fellow directors are A. Leigh and A. T. Godridge.

**First Trade Moulding**

Craxford Mouldings was formed ten years ago with a factory in Broadstairs and a staff of 20. Its first trade moulding was a converter box for Murphy TV sets. Today the firm's new factory at Broadstairs employs 300 and is manufacturing, in addition to trade and consumer products, an increasing number of moulded components for the car and electrical appliance industries.

The company undertakes both injection and compression moulding, and makes its own tools and has a design and advisory service.

## Mail Destroyed by Arson

The head office of John and E. Sturge Ltd. at Wheeleys Road, Birmingham, was broken into on February 5, and, it was alleged, a number of small fires were started deliberately. The damage included the destruction of a large part of the mail received the previous day.

Sturge are asking home market customers to send duplicate copies of correspondence and orders which might have arrived on the Saturday.

**The injection moulding room at the Broadstairs factory of Viking Industrial Plastics Ltd.**

# POLYSAR KRYNACS

**The non-staining properties** of Polysar* Krynac (nitrile) rubbers have been markedly improved and the raw polymer colour has been lightened. These improvements, together with the inherent advantages of easy processing and relatively low water absorption, provide the best balance of properties in oil resistant rubbers.

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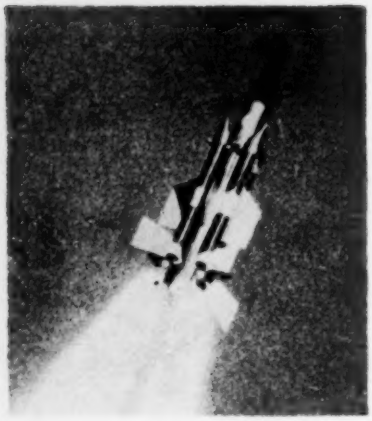

# Polymers Out In Space

**By N. H. LANGTON, Ph.D., M.Sc., F.B.I.S., Council Member of the British Interplanetary Society, National College of Rubber Technology.**
**In this, the second of two articles, Dr Langton considers the part that polymers are playing in tackling problems of re-entry**

ONE of the major problems in space research is not how to get instruments and men into space, as it was about two years ago, but how to get them back to the surface of the earth intact. This is the re-entry problem, and it is in the solution of this that plastics are playing an important role.

The problem is basically that of how to bring a space vehicle back through the atmosphere from an orbit round the earth without the frictional heat generated by the enormous speed of re-entry into the upper layers of the atmosphere raising the temperature of the body to incandescence. Metals are not satisfactory for this, as they are good thermal conductors and do not shield the interior of the vessel from the high temperatures reached on the surface. In order to obtain maximum thermal protection, it is desirable that much of the frictional heat be used in causing thermal degradation of the heat shield, the so called 'ablation' process. It is this transformation of solid into the gaseous phase during re-entry that comprises the most effective utilization of the heat transfer and heat blocking action. When the word ablation is used, however, it infers that although the material degrades thermally, it does not fail structurally. The process of ablation on re-entry is very complex, and it is difficult to define parameters that will allow the evaluation of the effectiveness of a material as an ablative thermal shield. A quantity often used, however, is the effective heat of ablation, defined as the heat transfer to a non-ablating calorimeter per unit mass ablated, and denoted by Q. The quantity Q is not a constant for a given material, but depends also upon the environmental conditions to which the material is exposed during re-entry. Also of importance are the thermal diffusivity, the heat of combustion, the viscosity and surface tension of the molten polymer, its emissivity, its melting point and boiling point.

Both thermoplastics and thermosetting resins are quite attractive materials for ablative shields. An account of work done, particularly with reference to Teflon, is given by S. M. Scala.[11] When a cured plastic is exposed to severe heating, a form of thermal degradation known as pyrolysis occurs. The result is the formation of various gaseous products, together with free radicals, which migrate to the surface. A solid residue in the form of a heterogeneous carbonaceous structure is the final result. This layer shrinks and cracks, and the surface takes on the appearance of a charred sponge.

### Promising Ablative Material

Teflon[12] is a promising material, and some experimental results are available. It is seen that the behaviour of Teflon as an ablative material is rather similar to that of quartz, except that the Teflon surface remains relatively cool, whilst quartz develops a hot surface. It is possible to compare various materials by calculating the total mass of ablating material required for a certain re-entry. When this is done the most promising materials rank as follows: 1, Graphite; 2, Quartz-like refractory; 3, reinforced plastic; and 4, Teflon; the latter ablating much more rapidly than the rest, so that more material would be required in the shield. The fact that less mass is required, however, does not necessarily indicate that graphite is the best material. Graphite is a good conductor of heat, and therefore would have to be backed by a thermal insulating layer to prevent the internal temperature of the space vessel increasing. It is difficult to be very definite about ranking the possible ablative materials, as so much depends upon the type of application and the environmental conditions. There is no doubt, however, that thermal shielding of re-entry vehicles by ablation is an important application for plastics in space. All the successful re-entry vehicles up to date have had thermal shields manufactured from plastics.

A promising material for use as an ablation shield which is under investigation at the moment is Micarta 259-2, which is a glass laminate with a melamine resin filler.[13] Experimental thermal ablation is brought about by exposing the material to the efflux of a rocket engine, burning a mixture of kerosene and hydrogen peroxide. Fine particles can be introduced into the combustion chamber and are ejected with the hot gases, impact upon the specimen simulating the erosion effects that a re-entry body would meet on entering an atmosphere at high speeds. The heat causes the production of a melt layer on the material surface, which protects the under surface from the effects of the bombarding particles. A theoretical analysis shows that the extent of the protection offered by the melt layer should depend upon its thickness and upon the sizes of the bombarding particles, and the relationship has been verified by experiment. Thermal ablation takes place by the melting of the glass laminate and the decomposition of the melamine filler. The melting glass causes the thin layer of molten material to flow over the Micarta surface, and the gaseous decomposition products are blown through this into the gaseous boundary layer. The formation of a melt layer is very important for vehicles re-entering an atmosphere containing dust, water droplets or ice particles, and it appears that a laminate of the type investigated would afford better thermal protection in these cases than those materials that do not produce a melt layer. It is important that the

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melt layer should have a high viscosity and surface tension to prevent the aerodynamic forces removing the layer from the surface before its energy of vaporization has been used in reducing the heat flow into the re-entry vehicle. The ablating shield material must therefore have a low thermal conductivity. These requirements are generally met by plastic materials.

**Thermal Properties**

A survey of the thermal properties of plastic materials for use in thermal shields has been made recently by Steg.[12] It is concluded that reinforced plastics can be considered as some of the most attractive materials for use in satellite re-entry. Amongst the possible materials mentioned are phenolic resins, silicone resins, melamine resins reinforced with glass, Refrasil (a form of silica) and nylon. The behaviour of these materials under ablation conditions is very complex. Nylon reinforced plastic pyrolyses, for example, to produce a fairly thick charred layer, which, however, is only about half as thick as that formed when glass or Refrasil is used. The nylon reinforced material shrinks after charring, whilst plastics reinforced with inorganic fibres tend to delaminate and expand. If nylon is used as a resin, it melts, vaporizes and reacts with the air without leaving a charred residue, whilst phenolic resin decomposes to leave a charred layer.

The final criteria of choice however, appears to be the efficiency of the material as a heat insulator, since all the materials considered are reasonable from the ablation point of view. Those materials which afford the maximum heat insulation with minimum weight are preferred, and on this basis Teflon and phenolic/nylon seem to be the best. From the point of view of structural properties, phenolic-resin is rather better than Teflon, since it does not recrystallize and expand as does the latter. A layer of material of about 1in. thick would maintain the internal temperature of a vehicle at below 200°F. during an average re-entry.

The analysis of the ablation of plastic heat shields that produce a charred surface has been recently carried out by Barriault and Yos.[14] The complications in the heat transfer due to the charred porous layer, which may be several millimetres thick, are discussed, and a steady state solution for the heat transfer is obtained. An analysis of the high temperature behaviour of plastics and rubber has also been given by Russell.[15]

It can be seen from this survey of the use of plastics as ablative materials that this is a field of considerable present and future importance. Much experimental and theoretical work has already been done, and plastics have actually been used successfully in re-entry vehicles. Further work will undoubtedly lead to the development of more efficient plastic ablative shields, and it is highly probable that the next major step in the conquest of space, that of bringing a man back to the Earth, will be achieved successfully solely because of the thermal protection afforded by the plastic covering of his re-entry vehicle.

**Engineering Applications**

There are many actual and potential uses of plastics as engineering materials in space vehicles. Their usage as seals and gaskets is of obvious importance, and was dealt with in previous articles.[1,2] Since that time, however, other possible applications have become apparent.

**An ablative nose cone under test**

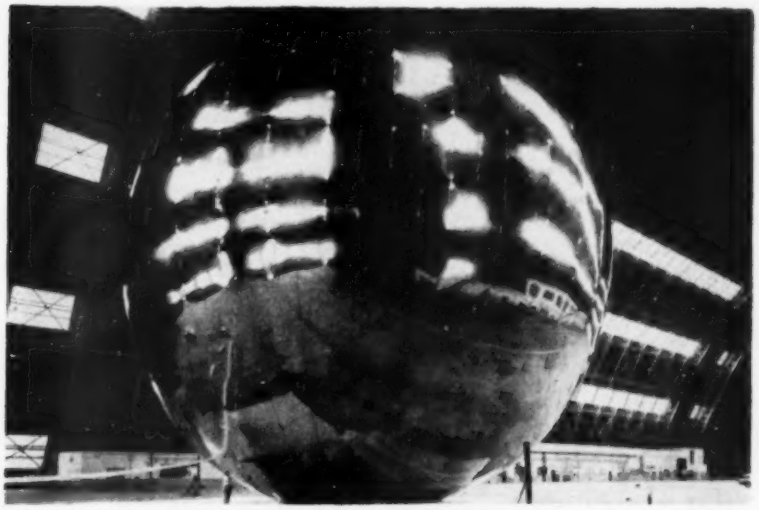
*By courtesy of National Aeronautics and Space Administration, USA*

The precision moulding of plastics to extremely close tolerances is necessary in the construction of the exit cones for the Minute Man rocket. For this purpose a 2,000 ton press with 12ft. of daylight and a 6ft. stroke was used. Nose cones for the Atlas satellite rocket were made in a similar manner. The fabrication of blast tubes, motor liners, throats, guide vanes, rupture discs and tail pipe insulators, for example, all require precision moulding. Nose cones are also built of glass fibre, and reinforced plastics are being used increasingly in the construction of rockets and missiles. One of the successful American satellites had a fibre glass body.

**Echo Satellite**

Many readers of this article have no doubt observed the American communications satellite Echo 1. This consists of a balloon of Mylar polyester film 0.002in. thick, made up from 82 tapered fragments, and has a diameter of 100ft. and a surface area of 31,400 sq. ft. The outside of the shell is covered with vapour deposited aluminium less than 0.00025in. thick which reflects 98% of the incident radio waves up to $2 \times 10^4$ Mc/s frequency. The sphere was packed in an accordion-type container 26½in. in diameter, and evacuated before launching. After launching, the sphere slowly inflated, partly due to the residual air expanding, and partly due to 30lb. of a sublimating powder inserted in the balloon before loading, 10lb. of benzoic acid beginning the expansion, and 20lb. of anthraquinone completing it. The internal pressure inside the sphere was about 0.0004 psi. Contrary to expectations, the balloon did not show early puncture by micrometeorites, and apparently survived the Perseid shower unharmed. The sphere also seemed to have retained its shape, an essential requirement for communications, in spite of the large temperature changes it underwent. It is interesting to realise that the first glimpse most people have had of a man-made body in space is of 132lb. of plastic film.

In the experimental Transit Satellite which is now in orbit, frequency stability of the transmitter is achieved by suspending the entire equipment section inside the outer shell by nylon lacings.[16] The nylon acts not only as a mechanical support, but reduces thermal conductivity to such a low level that, with the addition of a protective blanket of fibre-glass and aluminium foil, the temperature of the electronic equipment varies by only 1°F. over a day.



**The Echo I Satellite. This is 100ft. in diameter and is made from Mylar polyester film**

*By courtesy of National Aeronautics and Space Administration, USA*

**Other Uses of Plastics**

Many plastics have a high transmission in the visible spectrum but a large number of absorptions bands in the infra-red. They should therefore be excellent as protective coatings for solar cells, but there is the possibility that the polymer may out-gas and depolymerize under the reduced pressure and high temperature in a satellite orbit, and more development is needed in this direction.[17] Kodak far infra-red filters have, however, been protected in use by a film of polystyrene at the expense of a small amount of absorption loss.

Thus not only is there space in space for plastics, but the numerous new problems which are being faced and overcome in this field stimulate research and development in new directions, leading to the development of new materials which will have their uses on the ground as well as in space.

**Conclusions**

Of the many actual and possible uses of plastics in space, some of which were tabulated in last week's article, only a few have been considered in detail. This is because the main topics of interest at the present time are the applications of plastics involving thermal and combustion properties, and most of the development and research being carried out at the moment is in this direction. The use of silicon fabrics to reinforce plastics for high temperature usage at re-entry temperatures is one example. A recent problem to be solved was in the design of the Project Mercury tape recorder.[18] This had to operate in a 100% oxygen atmosphere, and because of the generation of ozone, rubber driving belts could not be used. The problem was solved by making belts of nylon webbing impregnated with silicone rubber. These belts were hand made, vulcanized at room temperature, and retained their length in use to within 0.015in.

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## Solid Fuel for Latest Sputnik

The rocket used to launch Russia's latest sputnik is believed to have been of a new four-stage construction about 250ft. high. It is thought that at least three of the stages were powered with solid fuel. (Dr N. H. Langton's first Polymers In Outer Space article, which appeared in last week's *RJIP*, dealt with the use of polymers in solid rocket propellants.)

The 6½ ton Russian satellite is by far the heaviest to be projected successfully. The propellant must have developed a thrust of at least 1m. lb.

## UK Companies Form Space Research Group

Eight UK companies have formed a new organization called the British Space Development Co. Its object is to exploit British participation in international space research.

The companies include British Insulated Callenders' Cables, de Havilland and Pye. The organization has an initial capital of £20,000, and it is understood that other companies are being approached to join.

The first aim of the organization will be to act as an agency and liaison body, probably also including later a substantial research and development organization.

## PI Proposed Visits to Italy and USA

If enough support can be obtained from members, the Plastics Institute intends to arrange visits to USA and to Italy this year. The USA visit would be to the National Plastics Exposition in New York, June 5-9, and would include trips to the Du Pont plant at Wilmington and the Monsanto plant at Springfield.

The Italian visit would be from October 2-7, taking in the Italian Plastics Congress which is associated with an international exhibition being held in Turin. Full details should be obtained from the Plastics Institute by February 14.

# Reclaimed Rubber

## ATTRACTIONS OF THE 'CINDERELLA OF THE RUBBER INDUSTRY'

THE first of a course of lectures on reclaimed rubber being held at the National College of Rubber Technology was on the development of the reclaiming industry and was given by J. M. Ball (Midwest-Reclaiming Co.). Mr Ball, who was introduced as the doyen of the US rubber reclaiming industry, said he believed that this was the first course anywhere to be devoted entirely to reclaimed rubber.

Reclaim, he said, was a product which had been referred to as the Cinderella of the rubber industry and was as essential to the manufacture of rubber goods as scrap iron to the steel industry or scrap glass to the glass maker. Its price was attractive and stable and its beneficial effects on processing not only justified but demanded its use in many types of product. In the 1920's consumption of reclaim rose sharply and even when, in the early 1930s, the price of reclaim exceeded that of new rubber, the American manufacturer was using on average 23lb. reclaim per 100lb. natural rubber. In the early 1950s when synthetic rubbers were used in large and rapidly increasing quantities consumption of reclaim rose similarly. These facts indicated that reclaim had other attractions besides price.

The improvements in processing were reduction of mix time, power consumption and frictional heat, leading to economy and safety. Cures were also improved by increase of speed and minimal reversion. The products had reduced shrinkage, thermo plasticity, swelling in liquids and good ageing properties were maintained or improved.

### Origin of Reclaiming

Although Hancock designed his masticator for the purpose of recovering unvulcanized waste rubber, he did not attempt to reclaim vulcanized material. This was first performed by Alexander Parkes who found that after swelling the waste in muriate of lime the pieces could be reunited by pressure.

The first large scale reclaiming was performed on waste boots and shoes which for a century formed the only major source of scrap. The reclaim was urgently needed to reduce cost and facilitate processing. By the 1890s the demand for reclaim outstripped the supply of scrap and the USA was forced to import waste rubber from Europe, particularly Russia. In 1910, to avoid a Russian export duty, the United States Rubber Co. set up a plant in Odessa and produced reclaim of such high quality that neither British nor American reclaimers could match it.

### New Scrap Sources

At the turn of the century, rubber manufactures had expanded and scrap from hose, bicycle tyres, carriage tyres and matting became available. A little later solid truck tyres formed a major source and from 1905 pneumatic tyres were reclaimed and soon dominated the waste rubber market. In 1916 some 25m. tyres were reclaimed and by 1959 this figure had grown to 120m. Today the supply of scrap tyres was about five times the foreseeable demand.

Reclaiming agents included those intended to remove free sulphur and those whose function was to destroy fabric. Processes patented before 1890 covered the use of calcium chloride, mineral acids, sodium hydroxide and calcium sulphide for the former purpose and for the latter lime, alum, acids, alkalis and sal-ammoniac were used.

Mitchell's process of the late 1880s involved boiling with mineral acid to destroy fabric followed by devulcanization in a pan. In 1889 he used pressure steam to improve efficiency but this acid process still required two steps and was now obsolete.

A. H. Marks, said Mr Ball, was the greatest figure in the history of reclaiming. He used caustic soda in a digester to remove sulphur, to destroy fabric and to devulcanize simultaneously. He induced a professor of chemistry to leave Harvard and join him in a venture which later brought them to Liverpool where a new reclaiming plant was set up. Their alkali process was still used, though in modernized form.

Mr Ball contended that the term 'devulcanization,' though it had been challenged as inaccurate, was correct if properly defined. He quoted Williams' definition of vulcanization as 'a change in rubber which results in an increase of resistance to deformation at ordinary temperatures,' and pointed out that devulcanization is the reversal of this process. Of the many devulcanizing agents that had been suggested the three major ones in use today were turpentine, coal tar and petroleum products. These, however, were not sufficient for the reclaiming of synthetics and their action was nowadays supplemented by that of powerful aromatic disulphides and similar materials.

### Equipment

Reclaiming equipment comprised grinding mills, magnetic separators, which dated from 1890, and refiners which were devised in 1899. In the latter the knife was set at an angle to the front roll, but the clever German invention (1911) of a three-roll refiner permitted two refinings in one pass and the output was thus increased considerably. Strainer-extruders were first made in 1912 and were still being developed to give more efficient mechanical working and greater production per man-hour.

Concluding his remarks the lecturer said that in USA reclaim was regarded as essential in tyres and mechanical goods. Last year American tyre manufacturers consumed 55% of the total reclaim consumption and a further 30% went into automobile goods and matting. He considered that British rubber manufacturers could with advantage expand their usage of reclaim to these levels. Much higher percentages of synthetic rubber were used in USA and tremendous quantities of reclaim contained a substantial proportion of synthetic material. This trend would continue and many American rubber manufacturers were showing a preference for such types of reclaim.

During the discussion which followed it was said that the reason for the smoothness of the Russian reclaim referred to was the presence of gutta-percha in Russian-made footwear waste. This fact came to light many years later when analytical methods were developed to differentiate these two hydrocarbons. In reply to another question it was explained that even though waste rubber tyres were very variable according to maker, size and whether tubed or tubeless, the reclaimer's stockpile was so large that a representative selection could be taken for reclaiming so that variability of the product was minimized.

BRIDGE FARREL

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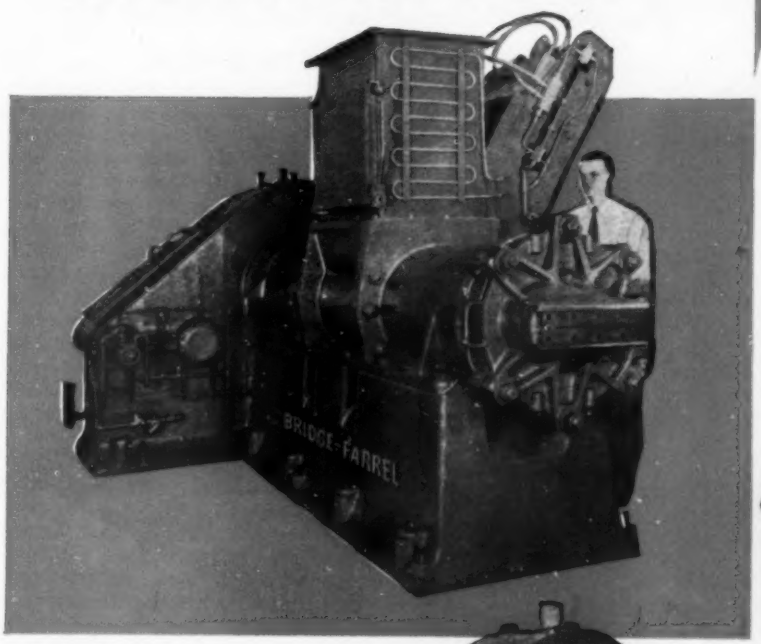
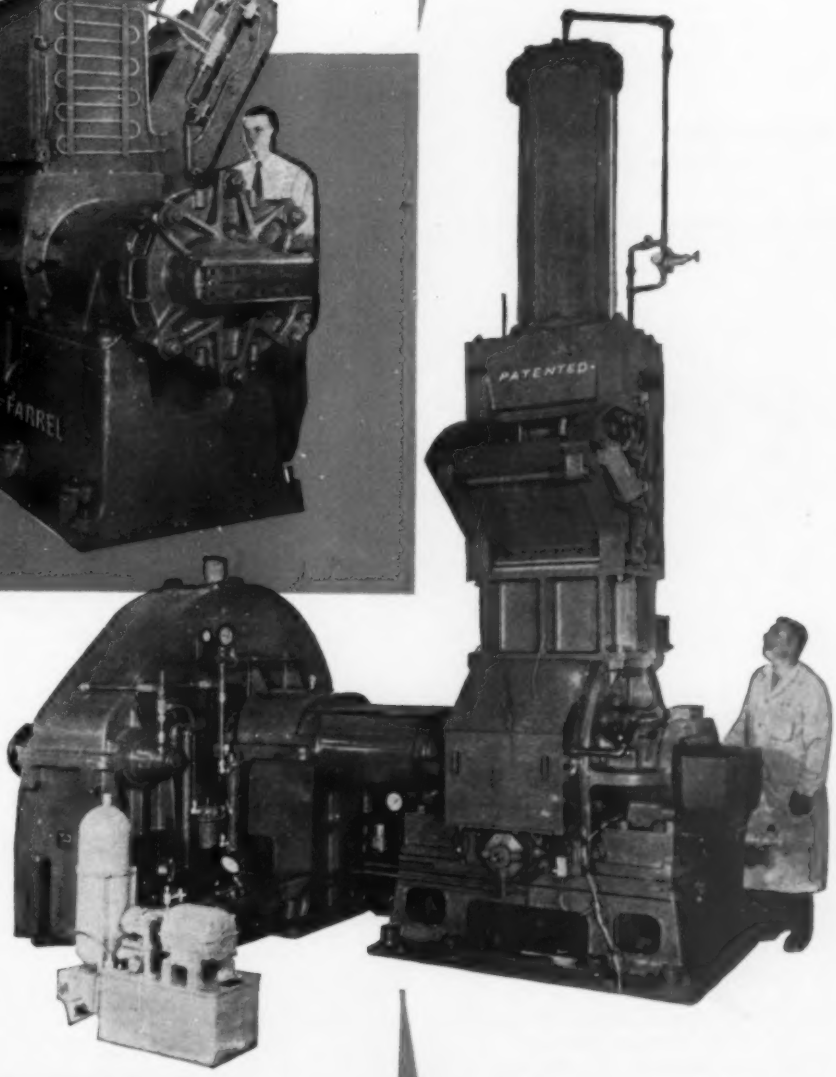



*(Illustrated above)*

**PLASTICS EXTRUDER** specially designed to automatically receive and extrude the batch from the BRIDGE-BANBURY MIXER under ideal fully controlled thermal conditions and continuously produce strip or rod form from BANBURY MIXER cycles as low as 2 minutes. Such combinations of machines have been designed and developed for various types of plastics and rubber and are the result of a vast background of experience and factory performance in modern methods of manufacture.

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E1

# BEHIND THE DUNLOP SYMBOL

What does Dunlop sell? Tyres. That's true. But tyre valves, too... millions of them each year... the rubber lining for a complete reservoir... two hundred different kinds of rubber mouldings for the aircraft industry... basketball boots... disc brakes... conveyor belting... And these are only a few of the thousands of products marketed by Dunlop in 1959 to the sum of £261 million. A record turnover, and the product of steady growth. The organisation behind the new Dunlop symbol is one of the most enterprising and progressive in the world.

**DUNLOP** SYMBOL OF PROGRESS

CPH/PR6/51

*AMERICAN LETTER — from Norman L. Hewitt*

# Battle Between Tree and Test Tube

## DIENE ECONOMY DEPENDS ON PLANT CAPACITY AND MONOMER COST

THE Battle between the Tree and the Test Tube was the title of Dr Dinsmore's talk presented before the annual meeting of the Rubber Manufacturer's Association held recently. The test tube part of this battle is represented by polyisoprene and polybutadiene. Demand in the US for the year 1965 is predicted as 140,000 long tons of PI and 205,000 long tons of PB, out of a total of 1,865,000 natural and synthetic. Natural is foreseen to have decreased to 320,000 by 1965. The present necessity of blending equal amounts of natural with polybutadiene is an important factor in predicting PB demand; polyisoprene is considered to be a complete substitute for natural.

The economic comparison of tree and test tube revolves around two variable items in synthetic production: the plant capacity and monomer costs. Various combinations of these (plus the fixed 5% royalty and overhead charges) show that a 25 cents polyisoprene requires an isoprene cost of 10 cents lb. and a plant capacity of 50,000 long tons. Similar figures obtain for polybutadiene.

These hard economic facts lead directly to Dr Dinsmore's final comment on the frequent prediction that we will soon have synthetic rubbers tailored to every use. The test tube cannot compete successfully with the tree on this basis. The major effort will continue to be the production of a general purpose synthetic.

### The Illuminated Tyre

The most flamboyant rubber product made recently comes from Goodyear. It is a coloured, translucent, tubeless tyre, cast from liquid polyurethane, with no fabric, plies, or laminations. Goodyear's name for their polyurethane is Neothane. The inclusion of a light source (small bulbs) within the tyre is justified as a safety feature to those motorists not taken by the aesthetic appeal. Before this, a nocturnal pedestrian could only assume that oncoming headlamps were supported by wheels; henceforth he can dodge with more assurance.

Dayco have also done some work on a fanciful urethane tyre, solid in that it contains foam rather than air. These are truly remarkable products: clear indication that the rubber industry has its share of new frontiers, together with the imagination to explore them.

### The Polypropylene Hinge

Can one produce a rigid plastic container with an integral hinge? The answer appears to be yes, if it is moulded from polypropylene. This is rigid enough for non-collapsing cases and boxes, but thin sections have sufficient flexibility and, more important, long flex life for easy and permanent hinge action. Hercules Powder Co., whose Pro-Fax has been used in most US integral hinge items, explains the unique performance of polypropylene for hinge application thus:

'As moulded, a polypropylene hinge web has unit tensile strength and stiffness equivalent to that of any other section of the moulding. It therefore has some resistance to flexing. However, on the first flex of this relatively confined area, fibre stress in the outer surface causes elongation exceeding the yield point, thus orienting the crystallite structure and causing necking down in that area. Such orientation increases tensile strength. Further flexing will increase orientation and the hinge will actually become stronger with use.

'Other thermoplastics, such as high density polythene, have several of polypropylene's characteristics. But none appears to provide the balance of properties required to give hinge performance comparable to that of polypropylene.'

### Wire and Cable

The annual symposium sponsored by the US Army Signal Corps is unique among technical meetings in the rubber and plastics industry. The locale for the past nine years — the Jersey Coast resort of Asbury Park — has much to do with this reputation. It has been said that a summer hotel in winter is the loneliest of all possible residences, and there is just enough of this atmosphere at the Berkley-Carteret in December to generate a certain feeling of 'togetherness.'

Deserted beaches soaked with spray by the whistling Atlantic winds offer little incentive for delegates to stray from their technical sessions and reunions.

The programme of the last symposium, which was held recently, offered a considerable scope of subject matter in keeping with the variety inherent in cable technology. Twenty-four papers included nine on cable construction, 10 on insulating materials, two on extrusion techniques, and three on test methods and equipment. Of the papers concerned with

**Driving by tyrelight—a time exposure and translucent tyres with lights inside produce these swirls of light as four cars circle a field in front of the Goodyear Tire and Rubber Co. in Akron. Strictly an experimental product at this stage, the tubeless tyres have been developed as an approach to building tyres without fabric reinforcement** *(see The Illuminated Tyre)*

insulating materials, polythenes (high and low density and crosslinked) were the subject of four presentations; nylon, silicones, fluorocarbons, and butyl rubber comprised the remainder in this class. The most inviting title was that of U. L. Lanza and P. M. Cook who described a heat-retractable form of polythene under the title 'Irradiation Induced Elastic Memory of Polymers.'

Another and more sobering approach to polythene's role in insulation was the blunt pronouncements of R. J. Ettinglos (Goodrich-Gulf) about early failures of high density material due to stress cracking and thermal embrittlement. He cautioned against expecting similar ageing properties from polymers of equal melt index (in the 0.24-up range).

This widely used test has definite limitations which arise from undetectable polymerization differences among the various producers. The success of high density polythene wire insulation depends on the use of very high molecular weight polymers. Antioxidants (di-beta-naphthyl *p*-phenylene diamine is preferred) enhance the performance life, whereas they are not effective in the lower molecular weight polymers. Channel black improves thermal embrittlement resistance in jacketing uses, although when both black and oxidant are present together, the effectiveness of the latter is mitigated.

**Geophysical Cables**

C. P. McKenna of the Victor Manufacturing Co., Houston, Texas, gave an account of the construction and processing of geophysical cables. These are the special tools of the branch of the petroleum industry which does geophysical prospecting by means of seismic surveys. Most interesting to a rubber technologist was Mr McKenna's description of his water refrigeration system for processing low temperature curing stocks. Each 40in. mill is supplied by an individual 10 ton rated water chiller, which makes possible the safe processing of accelerators such as butyl 8-sulphur for natural rubber and zinc oxide litharge-di-ethyl-thiourea for neoprene. All compounds are stored in a refrigerated room at 38°F.

**Corona and Ozone Effects**

According to its custom, the Research Department of Anaconda Wire and Cable, Hastings-on-Hudson, New York, provided another original and stimulating paper. This year's author was R. F. Grossman, who discussed 'The Degradation of Polymers by External Corona Discharge.'

Up to now corona and ozone effects have been considered to be the same phenomenon. It has been shown by several investigators that both high and low density polythene do not resist corona attack, although they are seldom subject to cracking from ozone alone.

Mr Grossman's view is that electron (rather than ion) bombardment is responsible for dielectric breakdown due to corona discharge and that this is independent of the presence of ozone. The distinction is nicely made in a comparison of butyl, neoprene, and polythene jackets subjected to gradually increasing voltage. The polythene's dielectric life decreases gradually as soon as applied voltage increases; for neoprene and butyl, no decrease occurs until 15 KV (the threshold for ozone formation) is reached, and then failure is precipitous. Evidently corona degradation of polythene is not accelerated by ozone.

As to the question of how to improve polythene's resistance to electron bombardment, and thus to corona degradation, it appears that the incorporation of chlorine into the polymer is beneficial. This is seen in the increase in corona resistance obtained by going from polythene to the chlorosulphonated derivative (Hypalon) and thence to polyvinyl chloride.

**A Time-Worn Favourite**

Only one paper of the three days' presentations followed the familiar compounding study pattern. This was an investigation of mineral fillers in butyl by W. J. Fischer, of Enjay, which revealed some interesting new properties in a time-worn favourite of the industry — talc. It was shown that resistivity, dielectric strength, and tensile were all considerably enhanced in butyl insulations formulated with substantial quantities of a structural variety known as platy talc.

One of the better known brands is Mistron Vapor, although there are evidently a number of similar products now in commercial production. The observed contribution to increased resistivity is explained by the conformation of plate-like particles to give a baffled path for electron diffusion through the insulation. There is, however, no ready explanation for an increase in tensile of almost 1,000lb. over that provided by fibrous talc or calcined clay of the same particle size. Evidently an unusually dense packing of the plates is involved. This definitely is an important contribution to the compounding technology of butyl rubber.

## Polycarbonates Reduced

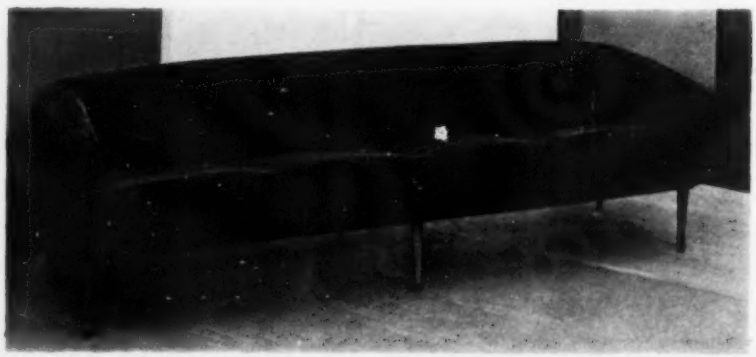
R. H. Cole and Co. Ltd., UK agents for Farbenfabriken Bayer's Makrolon polycarbonates, announce a reduction in price of these materials effective from February 1. New prices are as follows: Grades S and E, clear and unpigmented, from 7s. 3d. to 8s. 7d. per lb. delivered, depending on quantity. Surcharge for coloured material (Grade S) from 6d. to 10d. per lb.

# Upholstery Pile Fabric from Storeys

Storeys of Lancaster has produced a new pile fabric for upholstery called Auralan 75.

The pile of this 'breathable' fabric consists of Courtauld's rayon fibres, while the base is a PVC acrylonitrile blend. The tongue/tear strength is 7½lb. for both warp and weft and the bursting strength is 180 psi. The resistance to flex cracking is 50,000-60,000 flexes and the light fastness ranges from 4-6 plus on the SOC scale according to colour.

The fabric is manufactured by an electrostatic process which is said to ensure that the pile is uniform.



**This Uniflex Heritage sofa covered in the new fabric is being exhibited at the Furniture Show, Earls Court, which closes today (February 11)**

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# VIEWS and REVIEWS

## Deus ex Mathematica

IT is of the essence of polymer science and technology and a *sine qua non* of modern management to be able to cope with numbers and perform at least simple mathematical operations without fear or doubt. Even with maths beyond this stage, it is an undoubted advantage to be able to get the drift of the argument. But not everyone can.

It is significant of a technological age that 'innumeracy' is becoming as much a matter of reproach as illiteracy used to be. In fact, in my acquaintance with the present crop of young technologists, I have found many more illiterates than innumerates.

The division goes deep, severing history into (a) the recent past, when men argued about words, their meanings and their evocations, using them to describe the world within and without, and (b) the present time, when the world seems designed and run by a mathematician.

One result is the growth of popular expositions of mathematics. Many have been published in the last few months and, at my age, I am all for them because only by reading them can I get the real flavour of what the younger men of science are talking about. I offer no other excuse for drawing one to your attention.

When W. W. Sawyer wrote his now-famous Pelican book, *Mathematician's Delight* some years ago, I was so impressed by it that I bought getting on for a dozen copies and distributed them to deserving cases. He has since written *Prelude to Mathematics*, also published as a Pelican, at 3s. 6d. It is quite a different type of book with a different aim.

### Exciting Aspects

*Mathematician's Delight* was concerned with the traditional mathematics of the scientist and engineer. 'Mathematics teaches us how to solve puzzles' was its main theme; even the last chapter, 'The Square Root of Minus One,' was confined to its severely practical operations, for example, in the work of the electrician. *Prelude to Mathematics* emphasizes those aspects of mathematics which are exciting in themselves. For instance, right at the beginning he says:

'Calculus is referred to once or twice, but is nowhere used as part of the argument. This fact is interesting, as showing that some parts of recent mathematics (*i.e.* since 1800) are not a development of the older work, but have gone off in quite a new direction.' But he adds that the book does not claim 'to give a rounded account of what mathematicians are doing today,' but rather to present samples and especially to discuss how to look at an algebraic expression.

The early chapters deal with pattern and generalization, leading to unification and the hypergeometric function. The rest of the book follows an integrated plan: non-Euclidean geometries, projective geometry, infinity and imaginary points, transformations, and on to finite arithmetics and geometries; another route through the book is group theory, matrix algebra, determinants, and finally more complicated groups especially Galois groups. Difficult? Yes, but I found it more fascinating than the average thriller and much more remunerative. We are entering an era in polymer technology when the geometry of new spatial relationships is fundamental.

## A New Standard of Length

I wrote recently of my disappointment in discovering that the new Weights and Measures Bill now before Parliament would not establish in Britain a metric system based on a standard more invariable and ubiquitous than the present scratches on a metal bar. The *ASTM Bulletin* for December 1960, No. 250, p. 24, says that action taken by the 11th General Conference of Weights and Measures, meeting in Paris in October last, has defined the inch as 41,929,399 wavelengths of the orange-red line of krypton 86.

'Since the wavelength of a specific kind of light is thought to be unchanging, adoption of the new length standard removes uncertainties about the stability of the primary standard, which had always accompanied the use of a metal bar. Also, it will no longer be necessary for national standards organizations to calibrate their length standards against the Paris bar; the new standard is reproducible to great accuracy in any properly equipped laboratory. Some length measurements can now be made more accurately in terms of the new definition.'

## New Name and New Look

The *ASTM Bulletin*, by the way, is a journal I have praised as being among the stimulating, informative ones. Changes have been made in it, beginning with the January 1961 issue. It now has a new name, *Materials Research and Standards*, and is being published monthly instead of only eight times a year. One of the results is that 'it is hoped that the ever-growing number of technical papers that are accepted by the Society for publication will see the light of day with greater dispatch.' Long delay in the publication of scientific papers is still a reproach to the scientific profession; anything that will speed up the publication of new knowledge deserves support.

This lively journal can be obtained for a year's subscription (outside the USA) of $6.50, or even less for subscriptions of two or three years.

## What is Rubber?

A few weeks ago, I said that the ASTM was taking a difficult bull by the horns in trying out a glossary definition of the word 'rubber.' That definition has now been published, after more than two years' work by ASTM Committee D-11, in *Rubber World* for November 1960, Vol. 143, No. 2, p. 83.

'There will be continued study by the committee to improve this definition.' 'A tentative definition for rubber products has also been approved and is included under the same designation as the definition for rubber.'

Here is the new definition, and I am sure that any comments on it will be welcomed by *RJIP*, or the ASTM, or our own British Standards Institution.

# COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

*by* **F. C. JENNINGS**

'Rubber is an elastomeric material that can be or already is modified to a state exhibiting little plastic flow and quick and nearly complete recovery from an extending force. Such material before modification is called, in most instances, a raw or crude rubber and by appropriate processes may be converted into a finished product.

'When rubber is converted (without the addition of plasticizers or other diluents) by appropriate means to an essentially non-plastic state, it must meet the following requirements when tested at room temperature (60-90°F.; 15-32°C.).

'A. Is capable of being stretched 100%.

'B. After being stretched 100%, held for five minutes and then released, it is capable of retracting to within 10% of its original length within five minutes after release.'

## Control of Rubber Conferences

The same issue of *Rubber World* (November 1960, p. 69) has an editorial by R. G. Seaman, whose position in the US rubber industry entitles his views to be heard with respect. It has special authority at the present time because it concerns international rubber meetings and, when writing it, Mr Seaman had just returned from a visit to Europe where he had attended the rubber Congress in Berlin and the Synthetic Rubber Symposium in London. At the same time, he points out, the Rubber Research Institute of Malaya was holding a Natural Rubber Conference in Kuala Lumpur, and all these followed closely on the big Washington meeting in November 1959.

Other conferences of an international scope are already announced if not planned to take place during the next three or four years. Mr Seaman asks whether there should be a greater measure of co-ordination of such international conferences and invites comments from his readers.

Mr Seaman treads warily; he knows that in matters like this people easily take offence and he intends none. But he and all of us in the industry who are 'consumers' of these products of organization have a right to suggest improvements which would give us better value for money. We have a right to be heard especially if un-co-ordinated over-production is suspected of lowering the quality.

Mr Seaman says that it has already been suggested that our own RABRM (as it then was) is well suited to act as an international clearing house for conferences and exhibitions dealing with both rubber and plastics, but he himself thinks that such conferences should be limited to rubber and exclude plastics. He does think that some co-ordination is desirable.

Before asking just what is meant by 'co-ordination,' it might be well to have a look at that point about plastics. If Mr Seaman's attitude is typical, it seems to me that we in Europe differ from the Americans in this matter. For instance, it is well known that in Britain negotiations are in the late stages for the co-ordination (to put it no higher) of the work of the Plastics Institute and the Institution of the Rubber Industry. The very organization Mr Seaman refers to as a possible clearing house has changed since he wrote his editorial, becoming the Rubber and Plastics Research Association.

A recent straw shows the German wind to be set in the same direction: that is the change of name of the journal *Gummi und Asbest* to *Gummi, Asbest, Kunststoffe*.

If I assess European opinion correctly it is that rubber and plastics, technology and production, must ultimately coalesce into high polymers, and we in Europe think we are wise to start the process now. Certainly on this side of the Atlantic we tend to want to include both in our conference subjects.

But let us not quarrel over words; Mr Seaman may not be so far from us for he speaks of the 'excellent pattern for international rubber conferences set at the American meeting in Washington, D.C., in November 1959, in a programme which included papers on both natural and synthetic rubbers, rubber chemistry and physics, polymerization. . . .'

I think many of us would welcome some kind of control or co-ordination; it is the exact kind and amount which would determine how much support it would have and what its character would be. Mr Seaman speaks of proper timing and location for international conferences. I would think it difficult for a single national body (like the British RAPRA, as suggested) to decide matters like these, and even merely to make suggestions could easily offend someone or get nowhere because of the fear of offending.

Is it quite impossible to deal with this as we do with most other international affairs — by means of an international body?

Such a body need not meet more than once a year and might consist of two representatives from each of, say, USA, Great Britain, West Germany, France, and Italy (with power to co-opt from other countries if time and circumstances show it to be desirable and expedient).

## Synthetics and Rubber Prices

*Kautschuk und Gummi* for December 1960 has several items of interest. Its cover is illustrated with an excellent and striking photograph of the leaves and seed capsule of Hevea Brasiliensis. It has good wishes for the New Year in three languages, it has two good papers on vulcanization (which I will return to soon) and, on page 346, it has a discussion on the influence on prices of increasing production of natural and synthetic rubbers. This latter is important as giving an onlooker's point of view.

Its thesis is that, despite the planned and possible growth of general purpose synthetic rubbers throughout the world, there will be such an increase in plantation output per acre (and in total) particularly from Malaya, that the Malayan producer is very likely to be in a position to defend the sale of natural rubber by significant reductions in price.

The same sort of conclusion is reached in the editorial of *Rubber World* for December 1960 (page 73), where it is thought that the various technical developments in natural and synthetic rubber production will stabilize the price of natural at a level equal to or below the present price of SBR, maybe as low as 17½ to 22½ cents per lb. The outlook for the stereospecific rubbers is not yet as good as this commercially, but R. D. Dinsmore, of Goodyear, looks to continuing research to remedy this. And few will disagree with him.

CHARLES JENNINGS

# MEN *and* MATTERS

## *A Review of People and Events*

*by Peter Richards*

IN the spring of 1917, a truck equipped with 44 x 10 pneumatic tyres left Akron on a 750-mile expedition. On the first day the truck made only 16 miles, wore out two ropes and broke two telephone poles as the crew used block and tackle to get the truck out of mud holes.

But a freeze-up helped matters and the truck reached Boston 23 days and 23 spare tyres later — and the tyres were those new-fangled pneumatic ones.

This demonstration, which is quoted in the *Goodyear News*, was one of the first arranged by P. W. Litchfield, the late chairman of Goodyear, to show the potentiality of 'pneumatic tyred trucks as a form of surface transportation.'

Much credit goes to Mr Litchfield for breaking down prejudice in those early days and for proving his point in a dramatic way: for it is one thing to be right, and quite another to show that you are.

In 1918 he staged the first coast-to-coast trip by truck. Two years later a Goodyear truck did the transcontinental journey of 3,451 miles in 13 days 13 hours and 15 minutes. But it was not the speed record that mattered so much. The entire trip was made on one set of pneumatic tyres, without a single change.

**Presentation to Sole Agent**

A presentation has been made by Pirelli to G. E. Goudge, managing director of G. E. Goudge and Sons Ltd., sole agents for Pirelli footwear. It marks his association with the company over a period of 25 years. Making the presentation, Dr V. Rostagno, managing director of Societe International Pirelli of Basle, thanked Mr Goudge for his valued co-operation.

He recalled being present at a meeting in 1934 when the possibility of manufacturing sponge rubber soled footwear on the Rolman patent was first discussed between himself, Mr Rolman, the inventor of the process and Mr Venosta senior, father of the present general manager of Pirelli Ltd. From that meeting came the decision to establish footwear manufacturing facilities at the Pirelli factory in Burton-on-Trent, which today are turning out millions of pairs of slippers and other rubber soled footwear every year.

**G. E. Goudge (centre) receiving a silver tea service from Dr V. Rostagno, managing director of Societe International Pirelli of Basle. Also in the picture are (left to right) G. Venosta, general manager of Pirelli Ltd., G. J. Atkins, former footwear sales manager, and G. Baricalla, managing director of Pirelli Ltd.** (*See Presentation to Sole Agent*)

**Two More for Christy Board**

Christy and Norris Ltd. of Chelmsford, the manufacturers of machinery for granulating plastic sprues and rejects, have appointed two new directors, F. V. Mills and L. Hammond, to promote the company's expanding activities.

Mr Mills served his apprenticeship with the company from 1935-8, rejoining in 1949 after war service, and becoming sales manager in 1951.

Mr Hammond has been with the firm since 1950, and has been company secretary since 1954.

**New Lines for Old**

When plastics are used instead of wood or metal there is always a tendency to follow the traditional line of the product. The new opportunities of design that plastics offer are not taken often enough.

**BTR Industries Ltd. has appointed Ian Keith to the board of its subsidiary, British Moulded Hose Co. Ltd. Mr Keith is also managing director of BTR's Oil Feed Engineering Co. Ltd.**

To show what can be done when a designer is allowed to forget that 'it's always been done this way' and a sales manager does not say 'the public won't like it,' look at this child's rocking chair. Made by Jury

Holloware, it has a seat and base moulded in Rigidex high-density polythene.

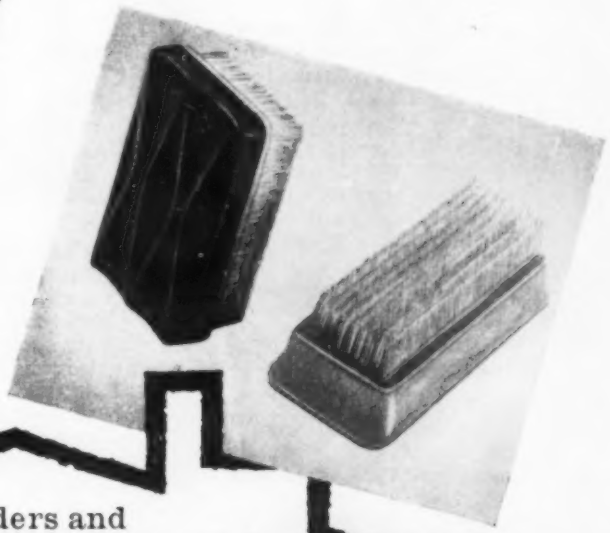
The designer has forgotten all about conventional rockers, but has used instead a large saucer-shaped base. The result is something that is not a slavish copy of the old, but something new, with very definite advantages other than those of the usual 'hygienic' and 'easily cleaned' variety. The chair can be rocked in any direction with complete safety — and this is an achievement of design and material in combination.

**New Floor Tile Shape**

Now you can permutate your floor as well as your pools. Kaleidotile — a floor-tile which is said to provide infinite new pattern permutations especially if combined with normal squares — has been made in PVC by James Halstead Ltd.

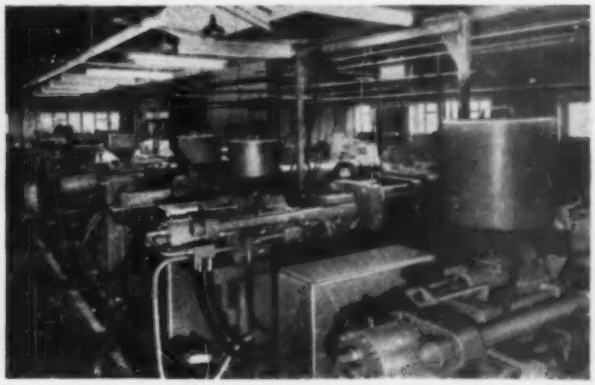
The new shape is made in left-

# Denman Products Ltd. won the 1960 'Alkathene' design trophy



Take your injection moulding to Denman Products Ltd., and you call in not only a moulder but a mould maker, Denman Tools Ltd. That means you get the whole job, from pencil sketch to successful product, all done under one roof. These brushes, made from 'Alkathene' I.C.I. polythene, won the 1960 'Alkathene' Design Trophy and show just what good design and production can mean. Write to or telephone Denman Products Ltd. now.

**Moulders and mould makers under one roof**



A12 *'Alkathene' is the registered trade mark for the polythene manufactured by I.C.I.*

**DENMAN PRODUCTS LTD.**, Bridgefields, Tewin Rd., Welwyn Garden City, Herts. Tel: Welwyn Garden City 6338

handed and right-handed pieces by cutting obliquely across the standard 9in. and 12in. squares at one-third of the side to give two trapezium-shaped halves.

### New Financial Line-up

Important changes in the financial division of Goodyear Tyre and Rubber Co (GB) Ltd. have been made. I. Thomson has been appointed financial director and secretary. D. G. Birch has taken over the office of treasurer with J. N. Law as assistant treasurer.

I. THOMSON

N. H. Smith will become the newly appointed comptroller responsible for all the company's accounting activities.

Born in Copenhagen, Denmark, Mr Thomson joined the world-wide Goodyear organization in 1952 in the Comptrollers Foreign Department in Akron, Ohio. He has since held positions with the company in Sweden and India. Mr Smith has been with the company since 1927; Mr Birch joined Goodyear in South Africa in 1946 and has been closely connected with Goodyear factory and general financial activities in various parts of the world.

D. G. BIRCH

N. H. SMITH

**Croxton and Garry, the distributors of a wide range of fillers and extenders, has opened a new office in Glasgow. T. F. Merrett has been appointed manager**

### J. W. Urban and L. C. Gosling

J. W. Urban, director of Monsanto Chemicals Ltd. since 1954, died in Bombay recently, after a short illness. He had been visiting India on official business connected with Monsanto Chemicals of India (Pty.) Ltd., of which he was managing director.

I also regret to report the sudden death of the transport manager of Blue Peter Retreads Ltd., Lionel C. Gosling.

Aged 61, he had been with the company for 32 years. He was awarded the B.E.M. for his services to the Ministry of Supply during the second world war.

### Ten Times to the Moon

Not many people can claim to have driven a number of miles equivalent to 10 times the distance to the moon. This is the record set up by Dunlop's celebrated test driver Jerry Atkins, who, when he retired recently, had over 2¼m. miles on the clock.

A tribute to him in *The Dunlop Gazette* records that he began his 51 years' association with the company as a van boy at Dunlop's Clerkenwell Road Depot. Shortly after the first world war he began his long test driving career. He has carried many famous industrial leaders, and has been personal driver to Sir Eric Geddes and Sir George Beharrell.

Comparing old cars with present day models Jerry thinks the old ones were better made, but caused more trouble because there were more things that could go wrong. He remembers appreciating, for example, the first mechanically operated windscreen wipers: there were times in the old days when he was able to keep going only by knocking out the glass of the windscreen!

**Fablon Ltd. is entering the export market with 'Fablonite', its latest decorative laminate. Z. Gale has been appointed export sales manager**

### Appointments in Brief

W. F. Jordan and C. A. Hill have been named vice-presidents of the Firestone Synthetic Rubber and Latex Co. The company's new plant at Orange, Texas, went into production last week.

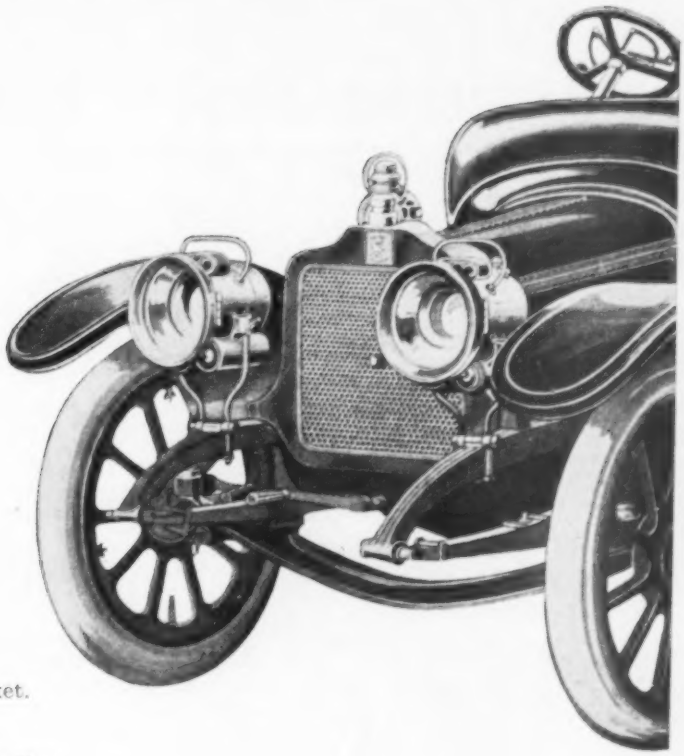
* * *

Grahame Martin-Turner, who retired from the De La Rue Company and from his directorship of Formica last December, has been appointed sales director of Flexpipe, a company within the Bowater Organization.

**Billy Butlin visited Dunlopillo's stand at the Earls Court Furniture Show, which closes today (February 11), and placed an order for 6,000 mattresses valued at £40,000. Demonstrating the difference in 'give' between springs and latex foam were identical twins, Vicky and Kathy Graham—although Mr Butlin did not need such an attractive means of persuasion. He has bought £250,000 worth of mattresses from Dunlop over the past seven years**

*Polly Ester Says . . .*

*'Protein — middle-aged but not a square'*



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so does the nature of the manufacturer's market.
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calls for firmer measures, an advertising policy
that is as streamlined as the product itself.
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No other medium offers such coverage to demonstrate
your sales points *in action* and add conviction to every dramatic angle. Television is
a powerful medium. Associated-Rediffusion, London's weekday Television
offers you the most prosperous and thoroughly
researched market in Britain: 49% of owners
bought their cars more than three years ago.
Are you claiming your share
of this big replacement market?

| YEAR CAR WAS PURCHASED | Total | Class | | | |
|---|---|---|---|---|---|
| | | AB | C | D1 | D2E |
| No. of car owners | 336 | 93 | 114 | 90 | 39 |
| Percentage who said 1957 or earlier | 49% | 54% | 52% | 50% | 25% |

These figures are quoted from the London Viewership Survey No. 3, commissioned by Associated-Rediffusion.
Eric Laman (Telephone: HOLborn 7888) will be pleased to give you more details of your potential London market.

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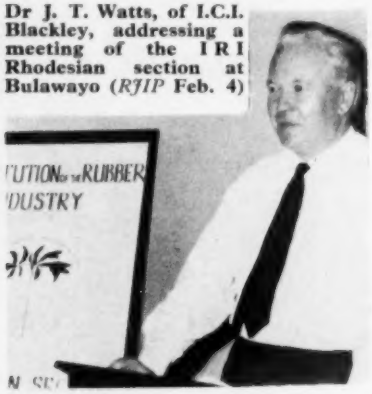
*IRI News*

# Tributes to Fordyce Jones

AT a recent meeting of the Council of the Institution of the Rubber Industry in London tributes were paid to the outstanding work and high qualities of the late Fordyce Jones. The Institution's motto 'To promote a better understanding and closer relationship between all sides of the rubber industry,' was largely his phrasing. His zeal and enthusiasm in promoting the industry were recalled and it was resolved that an expression of appreciation would be published in the Proceedings. (An obituary appeared in *RJIP* Nov. 26 914.)

**Dr J. T. Watts, of I.C.I. Blackley, addressing a meeting of the IRI Rhodesian section at Bulawayo (*RJIP* Feb. 4)**



**Ceylon Section**

Dr E. D. C. Baptiste, who was given a warm welcome by the Council, reported that the new section in Ceylon had made a good start. The first three meetings had been well attended and leading firms were showing interest and encouraging their staffs to take part.

**Council Elections**

At the Council meeting George Martin was elected chairman of the council for 1961/1962, and S. D. Sutton vice-chairman.

L. R. Mernagh was elected to represent the IRI on the Rubber and Plastics Research Association. Together with H. Willshaw, he was also nominated to represent the IRI on the governing body of the National College of Rubber Technology.

A. S. Craig was admitted to the Fellowship of the Institution, and G. Cameron, W. Holland-Bowyer and J. Kirkwood were elected to Long Service Membership.

The following committees for 1961/1962 were elected:

*Executive*

C. H. Birkitt, C. M. Blow, T. J. Drakeley, N. C. H. Humphreys, L. R. Mernagh, L. Mullins, F. M. Panzetta, F. Savaage, J. R. Scott and J. T. Watts.

*Examinations and Qualifications Board*

H. C. Baker, J. M. Buist, J. H. Carrington, F. H. Cotton, W. C. Davey, T. J. Drakeley, C. Falconer Flint, M. M. Heywood, E. H. Hurlston, F. A. Jones, W. McG. Morgan, E. F. Powell, W. H. Reece, J. R. Scott and W. C. Wake.

*Education*

K. Axon, H. C. Baker, F. W Ball, C. H. Birkitt, J. M. Buist, J. H. Carrington, H. Claber, F. H. Cotton, A. S. Craig, W. C. Davey, J. W. Denson, T. J. Drakeley, C. Falconer Flint, W. Gerrard, R. Harrison, M. M. Heywood, E. H. Hurlston, F. A. Jones, Maldwyn Jones, R. C. W. Moakes, W. McG. Morgan, L. Mullins, F. M. Panzetta, Mrs L. F. C. Parker, E. F. Powell, W. H. Reece, L. L. Roe, J. R. Scott, W. C. Wake, and J. E. Maitland-Edwards (co-opted).

*Papers and Publications*

H. C. Baker, J. M. Buist, F. H. Cotton, B. L. Davies, J. W. Denson, T. J. Drakeley, C. Falconer Flint, E. R. Gardner, F. C. Jennings, T. H. Messenger, G. E. Nettleship, G. A. Shires and H. J. Stern.

*Finance*

C. H. Birkitt, C. M. Blow, J. H. Carrington, T. J. Drakeley, L. R. Mernagh, L. Mullins, F. Savaage and S. D. Sutton.

*Medals Selection*

Geo. Martin, T. Martin, J. R. Scott and S. D. Sutton.

# Production Census for 1958

PART 35 of the Board of Trade report on the census of production for 1958 refers to the figures for synthetic resins and plastics materials. This is available from the HMSO and costs 2s.

The figures in the report were compiled from returns made by over 100 firms, detailed figures coming only from those employing 25 or more persons. They relate to establishments engaged in the manufacture of synthetic resins and plastics materials in the form of moulding and extrusion compounds, solid and liquid resins, sheets, rods and tubes, solutions, emulsions and dispersions, and synthetic resin adhesives.

The figures given for 1954 correspond as closely as possible to those given for 1958, but the correspondence is not exact, especially in respect of small firms who gave only limited information.

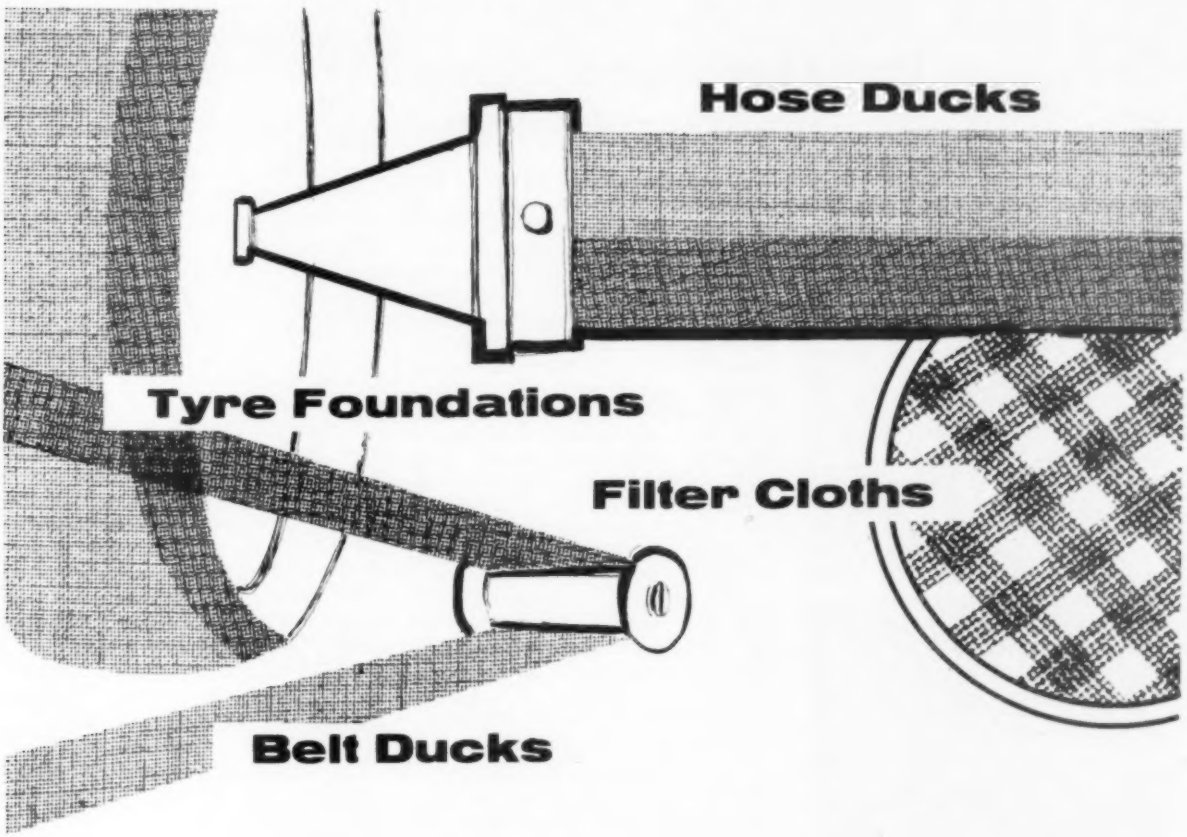
Table 1 gives an industry survey for all firms submitting returns and, as would be expected, the figures show the considerable expansion that has taken place. The total number employed has risen from 21,500 in 1954 to 30,300 in 1958, capital expenditure for building work from £1,526,000 to £2,660,000 and sales from £78,037,000 to £135,032,000.

Detailed figures are given of the sales of principal products of the industry broken down into the more important materials (these were published in *RJIP*, May 30 1959, 840) and these show the relatively large increases in the use of thermoplastics compared to the more modest advances made by the thermosetting materials. Sales of polystyrene were up from 19,500 tons to 33,100, PVC increased from 62,400 to 115,500, while phenolics only moved from 52,000 to 55,000 tons.

## BICC Eastern Operates from Chelmsford

The Eastern Region of British Insulated Callender's Cables Ltd. is now operating from premises in Chelmsford. The address is Friars Walk, Friars Place, Chelmsford, Essex.

**A feature of the swimming pool in the new Canadian liner *Empress of Canada* is a large mural of seaweed on coral, designed by Paul Gell. The pattern is permanently incorporated in Warerite laminated plastics. The seaweed is formed with silver, gold and old gold metallic foils on a sea-blue background**




**Tyre Foundations** **Tarpaulin Canvas & Sail Cloths** **Liner & Wrapper Cloths**
**Filter Cloths** **Transmission & Conveyor Belting Ducks** **Hose Fabrics**
**Boot & Shoe Materials** **Protective Clothing**
**Fabrics for Rubberising**
**Plasticising and Laminating Purposes**
**Printers' Blanket Wigans**

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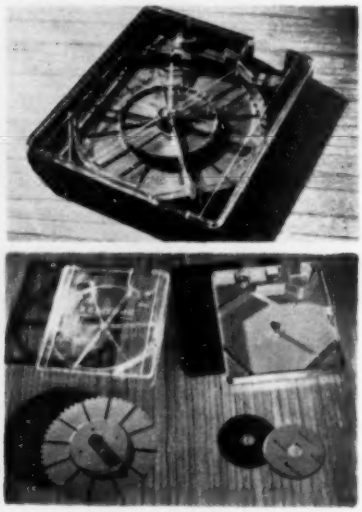
Telegrams: 'HAY' Dunfermline
London Office: 74 Cheapside, E.C.2. Tel: CITY 5901

# Precision Parts for Piped Music

## TAPE CASSETTE INCORPORATES FOUR STYRENE MOULDINGS

AN ingeniously designed tape cassette is being moulded by Ekco Plastics for Reditune Ltd., who provide piped music for any setting, from a restaurant to a railway station. Music from a library of over 7,000 titles is supplied on magnetic tape,



**The complete cassette (*top*) consists of the four mouldings shown in the bottom picture. The spool base (with cogs) and the spool top (on the right of the base) are cemented together and the radial rods can be seen, fixed on the face of the spool base**

and the design and accurate moulding of the cassette, which houses an endless tape allowing continuous playing of a 90-minute programme, is said to have contributed much to the success of this method of providing music.

Each cassette comprises four separate mouldings — the body, the spool base, the spool top and the lid. All except the latter are in high-impact polystyrene, the lid being moulded in transparent polystyrene. The body incorporates two precision-ground glass inserts, a spindle on which the spool turns and another small spindle to locate an interlocking brake lever.

The spool spindle is internally threaded to take the single screw which attaches the lid to the body. The successful operation of the cassette demands freedom from distortion and a high finish with complete absence of flash.

### Controlled Technique

A feature which calls for rigidly controlled moulding technique is the need for moulding the spool centre hole to a tolerance of 0.002in. The endless magnetic tape unwinds and rewinds on the spool simultaneously and this involves considerable movement between tape and spool. To facilitate this movement, the base of the spool has 12 radially positioned graphite rods cemented to it, the tape actually resting on these rods during playing.

The spool top is moulded separately and subsequently cemented in position. This eliminates the difficulty which would otherwise arise from the fact that the periphery of the complete centre boss is concave; it also avoids problems of sinkage due to the extra thickness of this part.

The body and lid are moulded on 8oz. machines, the spool-base on a 4oz. machine and the spool top on a 2oz. machine.

## Mould Release Agent

Solvolene Lubricants Ltd. has produced a silicone aerosol called Solvosil for use as a mould release agent, the effect of which is said to last for several mould castings.

Solvosil is also said to function as a filament lubricant in the manufacture of artificial fibres.

## New Money

Statistics compiled by the Midland Bank show that the amount of 'new money' raised in the UK in January was £45.7m. Among the issues included in the January total was that of £10.4m. raised by the Metal Box Co. Ltd.

## UK 1960 RUBBER EXPORTS £4m. UP

Direct exports of British rubber manufactures of all kinds during 1960 were nearly £4m. higher than in 1959. This represents an increase of over 9%, or half as much again as the average for British industry as a whole.

The figures, issued by the Federation of British Rubber and Allied Manufacturers are: 1960, £46,206,199; 1959, £42,235,215. Increase, £3,971,984.

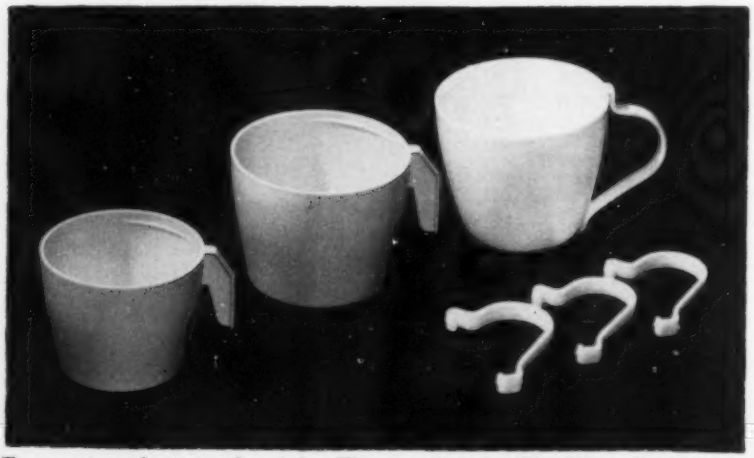
The Federation points out that these figures take no account of the vast quantities of rubber components sold to British manufacturers and exported by them as part of their own end products. The value of indirect exports of this kind is estimated as at least equal to — and possibly very much greater than — that of the direct exports given above.

## Intermediate Viscosity Masterbatch

An intermediate viscosity rubber masterbatch which combines synthetic rubber and a reinforcing resin has been introduced by the Chemical Division of Goodyear Tire and Rubber Co. in USA.

Designed as a general purpose material, the new substance is said to be suitable for shoe soling and other light coloured compounds that require high abrasion resistance. Called Plioflex 224, the new rubber exhibits good hardness and stiffness characteristics; and is claimed to have excellent abrasion and tear resistance, tensile strength and mould flow properties.

It is to be distributed in the UK by Hubron Sales Ltd., Failsworth, Manchester.



**Two new products produced for Thermos Ltd. by The Poppe Rubber and Tyre Co. Ltd., Twickenham. The vacuum flask cups with handles are injection moulded in Erinoid high-impact polystyrene and the clip-on handles to fit conventional flask caps are of high-impact polystyrene supplied by Shell**

*THE LEGAL ANGLE*

# Who Owns the Invention?

*By a Barrister*

*'Research in another field, but which has application in the rubber and plastics industry, has been carried out in the Hungarian Varnish Paint Factory. This has been an attempt to produce organophil bentonites, and a patent on their process has been applied for.' — RJIP, January 21 1961.*

Research, of course, goes on constantly in the rubber and plastics industries. Ingenious minds produce brilliant solutions — and so technology advances. In lands where the State owns all, this presents no great legal problem. The industry concerned may patent an invention to prevent piracy from abroad, but the individual technician will certainly have no right it it. He may be awarded a bonus or a prize, but that is the end of it.

But what of Britain? How far has an inventor a claim to the process or gadget, the product of his fertile mind?

The first kind of case is a simple one. Where a man is employed by you to do research for you then — unless his contract of service provides to the contrary — any invention will belong to you. After all, that was the object of employing him in the first place.

**Inventions Outside Polymers**

The second category is equally uncomplicated. If you employ a technician to design machinery for the production of tyres, then if — in his own free time — he invents a new hair dryer, a cardboard box maker, a chocolate cake recipe, or anything else completely unconnected with rubber and plastics, then this is clearly his own and he can do what he wishes with it. If he can make a profit from it, then the law wishes him the best of luck.

But suppose that you employ a technician to advise you on technical matters relating to your business, but whose duties do not include the invention of new processes, the development of new machines or the creation of experiments in design or production techniques. What happens if he gets a bright idea and wishes to patent it? Is it his — or yours?

This is the precise situation which arose in the famous case of Homewood v. The British Syphon Co. Ltd. A chief technician designed an improved form of soda water syphon. This was entirely his own initiative as he had not been asked, invited or employed to design ways of dispensing drink. When he sought to patent it, the company tried to prevent him. 'Any product designed by our employee which is concerned with our business must be ours,' it contended.

'Nonsense,' replied Mr Homewood. 'I was not employed to design soda water syphons and you did not ask me to do so. Therefore the product is mine.'

**The Court's Decision**

The Court decided in favour of the company. 'Would it be consistent with good faith as between master and servant,' asked the Judge, 'that he should in that position be entitled to make some invention in relation to a matter concerning a part of the plaintiffs' business and either keep it from his employers, or even sell it to a rival and say: 'Well, yes, I know the answer to your problem, but I have already sold it to your rival'? . . . It seems to me that he has a duty not to put himself in the position in which he may have personal reasons for not giving his employer the best advice which it is his duty to give if and when asked to give it.' So the employee lost his case.

To whom did the invention belong, then? Let us examine another leading case: Stirling Engineering Co. Ltd. v. Patchett. 'It is an implied term . . . in the contract of service of any workman,' said the House of Lords, 'that what he produces by the strength of his arm or skill of his hand or the exercise of his inventive faculty shall become the property of the employer. If the employment is of a designer, that which he designs is the property of the employer, which he alone can dispose of. If it patentable, it is for the employer to say whether it shall be patented, and he can require the employee to do what is necessary to that end. And if it is patented in their joint names, the employee holds his interest as trustee for the employer. If this is . . . the law, it can only be excluded by an express agreement that it shall be varied by some other legal relationship created.'

The answer then is that if you are an employee of inventive genius, then the products of that genius — insofar as they relate to rubber or plastics — will inevitably belong to your employers, so long as they are invented during the period of your employment. If you want to be able to retain an interest, or have the right to patent, your own inventions, it is up to you to see that there is such a term in your contract of service. An express term of that kind would prevail over the general, common law rule.

On the other hand, if you are an employer of men with inventive minds, anything they produce while in your service — so long as it is related to your industry — will be yours. You can patent it . . . force your employee to do so . . . reap the benefits of your intelligent choice of staff. A servant's inventions concerning the industry where he is employed will only belong to him if he has had the foresight to include a term in his contract of service with you, giving him this unusual right.

## A NEW LOOK IN CONTAINERS

A new range of extruded aluminium containers — called Plexicap — developed by Metal Box Co., is fitted with a specially designed cap

made by the company's plastics group.

The aluminium tubes have an outward curl at the top which is tightly gripped by two sealing rings on the inside of the cap. One ring is on the skirt of the cap and fits closely round the outside of the curl, while the other is on the top of the cap and presses against the inside of the tube. The seal obtained in this way is said to be comparable in performance to that of a screw cap container fitted with a rubber wad, but to cost less.

## Miss Ruby Church

Miss Ruby Church, a member of the office staff of the Institution of the Rubber Industry for nearly 40 years, died suddenly on February 7.

# Rubber Statistics

## UNITED KINGDOM—CANADA—WEST GERMANY—SINGAPORE

UK imports of rubber (natural, synthetic and reclaimed) in December 1960 were 24,455 tons, according to Board of Trade figures. Exports were 5,232 tons. Detailed figures are given below:

| | Dec. 1960 | Dec. 1959 |
|---|---|---|
| IMPORTS | | |
| Nigeria | 2,854 | 2,420 |
| Singapore | 4,041 | 4,262 |
| Federation of Malaya | 7,816 | 7,655 |
| Ceylon | 496 | 765 |
| British North Borneo | 227 | 218 |
| Canada | 1,959 | 2,846 |
| Other Commonwealth Countries and Irish Republic | 146 | 244 |
| France | 18 | — |
| Vietnam | 896 | 202 |
| Indonesia | 1,415 | 207 |
| USA | 2,445 | 2,658 |
| Other foreign countries | 2,142 | 1,189 |
| Total | 24,455 | 22,666 |
| Rubber latex | 1,928 | 3,856 |
| Other raw, including crepe | 17,610 | 12,463 |
| Balata | 84 | 61 |
| Synthetic rubber | 3,458 | 5,250 |
| Others | 1,375 | 1,036 |
| Total | 24,455 | 22,666 |
| EXPORTS | | |
| Commonwealth countries and Irish Republic | 1,385 | 1,503 |
| West Germany | 421 | 674 |
| Spain | 878 | 555 |
| Other foreign countries | 2,548 | 1,860 |
| Total | 5,232 | 4,592 |
| Synthetic and reclaimed rubber | 2,739 | 1,903 |
| Waste rubber | 2,493 | 2,689 |
| Total | 5,232 | 4,592 |

### Canada

Consumption of rubber in Canada declined in November to make the decrease in the first eleven months of 1960 10% compared with corresponding period of year before.

Consumption of all kinds of rubber in November amounted to 9,527 long tons, a decrease of 9% from 10,466 in the month of 1959.

Larger amounts of synthetic rubber were consumed in November than a year earlier, while consumption was smaller for natural and reclaimed rubber. In the cumulative period there were decreases for the three kinds.

The production during November amounted to 14,012 long tons, including 13,428 tons of synthetic, and 584 tons of reclaimed. This compared with 12,414 tons in 1959 comprising 11,853 tons of synthetic and 561 tons of reclaimed. In the cumulative eleven-month period production totalled 151,633 long tons, including 145,737 tons of synthetic and 5,896 tons of reclaimed, compared to 93,399 tons and 87,719 tons of synthetic and 5,680 tons of reclaimed, in the corresponding 1959 period.

### West Germany

Production of rubber goods in West Germany during 1960 amounted to about 530,000 tons, an increase of about 11.4% over the 475,000 tons produced in the previous year, industry sources report.

The increase is thought to have been mainly through the greater use of synthetic rubber. Consumption of this amounted to about 100,000 tons against 65,166 tons previously.

Industry sources believe that production of tyres and technical rubber goods last year both increased 15%. About 231,000 tons of rubber were used in tyre production, and about 273,000 tons in technical rubber goods.

### Singapore

Stocks of all grades of rubber in Singapore at the end of December amounted to 62,994 tons against 51,730 tons at the end of November.

The December stock comprised in dealers' hands 47,685, in port 11,768, on estates 29 and stocks on trans-shipment from non-Malayan ports 3,512 tons.

## COMPANIES in the NEWS

### Firestone

The Firestone Tyre and Rubber Co. has accelerated expansion of its facilities abroad because of opportunities overseas for sales and profit, Raymond Firestone, the company's president, told the annual company meeting in Akron.

He said Firestone's capital expenditures last year were nearly $83m., 'a substantial part of which we spent on our foreign facilities.'

Mr Firestone noted that while demand for rubber in USA decreased slightly in 1960 from 1959, world consumption was a record.

He said because of the growth of car ownership abroad, the market for tyres outside USA had increased in importance and the future appeared most promising.

Firestone is building a tyre plant at Bethune, France, and a synthetic rubber plant at Port Jerome, France, to serve the Common Market. The company is also building an SBR plant at Bareilly, India, in co-operation with Indian interests.

### BTR's Rights Issue

Details were posted recently to ordinary stockholders in BTR Industries of the rights issue of 900,000 5s. ordinary shares at 12s. 6d. on a basis of one-for-fifteen held on December 30.

This is the second stage of the company's financing programme to raise approximately £2m.

## BUYERS STUDY PLASTICS

A course on advanced purchasing, organized by The Purchasing Officers' Association, will include a study group on plastics, arranged in co-operation with the British Plastics Federation.

The course, which is intended for senior executives, will be held at Christ Church and Pembroke College, Oxford, from April 10-14.

The plastics study group will be addressed by three speakers: C. L. Child (I.C.I.) will talk on the properties of plastics, G. G. Small (Fraser and Glass) on the production of finished and semi-finished articles, and J. Morrish (Thermo Plastics) on commercial aspects. Detailed programmes can be obtained from the Association at 146a, Queen Victoria Street, London E.C.4.

## Modified Polybutadiene

A modified polybutadiene polymer called Hycar 1000X145 has been introduced by B. F. Goodrich Chemical Co., of Akron, Ohio. It is said to have excellent abrasion resistance and will not become brittle at temperatures as low as −85°F. It has moderate resistance to the effects of fuels, solvents and chemicals.

It is claimed that these characteristics, coupled with the polymer's good electrical properties and ozone resistance, make it suitable for use in the electrical wire and cable field.

## Cold Bonded Lining

A new industrial rubber lining material that cold bonds itself to metal and other surfaces with field-applied cement has been developed by Goodyear Tire and Rubber Co. at Akron, Ohio.

This natural rubber covering, called Jade Green Armabond, is said to provide complete protection against impinging abrasion and most inorganic salts, alkalis and acids.

## Chemical Storage Tanks

Bristol Aeroplane Plastics Ltd. have developed a range of reinforced plastic tanks for the storage of corrosive or radio-active liquids. It is expected that the use of reinforced plastics materials for this application will increase considerably during the next few years and the company is making a survey of the requirements for chemical storage tanks in industry. Initial investigations cover applications where the corrosive nature of the stored liquids is being partially overcome by using stainless steel or specially-coated metal.

*P.V.C.-coated 'Terylene' flexible ventilation ducting in use at Parsonage Colliery, Leigh, Lancashire*

# 'Terylene' for coated fabrics

Coated 'Terylene' fabrics are being produced in a variety of types and weights. They're tremendously strong. Selectively coated with natural or synthetic rubbers, plastics or resins, they have outstanding resistance to heat and chemicals and, more than any other kind of coated fabric, to sunlight and weathering. That means they last longer.

These fabrics are being put to an increasing number of uses in industry: life rafts, hatch tarpaulins and collapsible liquid containers are just three of them. Coated 'Terylene' is only one of the ways in which this all-British fibre is serving industry. For further information. write to the address below.

'TERYLENE' ICI Polyester Fibre

*'Terylene' is the trademark for the polyester fibre made by* IMPERIAL CHEMICAL INDUSTRIES LIMITED, FIBRES DIVISION, HOOKSTONE RD, HARROGATE, YORKS

# PATENT SPECIFICATIONS

*The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).*

### PVC Belt Repair

No. 854,916. Charles Michael Turton. Application, March 2 1956. Filed, May 29 1957. Published, November 23 1960.

The repair of such articles as conveyor belts in mines can be effected *in situ* by the use of a patch and cold adhesion under pressure. A method is described of making suitable patches with feathered edges. These may be formed from a paste containing about 60% PVC, 40% plasticizer such as tricresyl phosphate or dioctyl phosphate and a small amount of heat stabilizer such as lead or calcium stearate. This is spread on a metal plate, the edges feathered off, and immediately this has been done, the upper surface is heat treated to form a skin. The patch, still on its plate, is then introduced into an oven to be gelled, cooled and stripped from the plate. The flat surface is coated with an adhesive such as Bostik with a PVC base and this is covered with a protective layer of polythene which can be removed when the patch is required for use.

### Vinyl Powders

No. 854,949. Kalle and Co. AG. Application and Filed, July 1 1957. Published, November 23 1960.

Various difficulties arise in the production of powdered polyvinyl resin products by the known method of drying an emulsion dispersion of the resin in an atomizer, as lumps tend to form, particularly in the case of products which are sticky due to their plasticizer content. If the powder is formed by the following method the products are non-sticky and there is no tendency to agglomeration.

An aqueous dispersion of a polymer of a vinyl ester of a fatty acid containing a plasticizer for the polymer and containing a dissolved water soluble cellulose ether or a dissolved salt of a water soluble cellulose ether acid is spray dried by the normal method. The amount of cellulose ether is small and should be between 0.1 and 5% of the plasticized resin.

### Urethane Stabilizers

No. 854,965. Farbenfabriken Bayer AG. Application and Filed, August 1 1958. Application in Germany, August 9 1957. Published, November 23 1960.

Reaction products of polyhydroxy compounds with excess of isocyanates are known. Those containing free isocyanate groups also contain urethane groups, the hydrogen groups of which are also able to react with isocyanates, so that on storage a decrease in —NCO content occurs and the viscosity rises considerably. It is desirable that this secondary reaction should be at least delayed, if not prevented, and this can be done to some extent by the addition of acidic acting substances such as acid chlorides. It has now been found that trialkyl borates and boron triaryls substantially increase the storage ability of such reaction products and suppress secondary reactions to a considerably greater degree than do the acidic acting substances. The amount to be added varies considerably, depending on the reactivity of the combinations and on the stabilizer used, but should be less than 10% of the weight of the isocyanate modified polyhydroxy compounds. The addition has no adverse effect on the subsequent processing of the compound.

## Small Particle Accelerators

The 'LS' brands of Vulcafors accelerators DPG, MBT, ZDC and ZMBT, just announced by the Dyestuffs Division of I.C.I., are specially prepared wet cake brands whose primary particles are said to be of 1-2$\mu$ diameter for easier latex compounding. It is claimed that only a slurrying treatment is necessary with a dispersing agent in order to break up the soft agglomerates. A ball milling time of one to two hours is said to be adequate.

The accelerator content figures for the four brands are 47.5% for the DPG brand, 55% for MBT, 59% for ZDC, and 61% for ZMBT, with a tolerance of ± 3% initially.

## NONOX B NOW IN ROD FORM

Nonox B antioxidant is now being produced by I.C.I. in the form of short rods as well as in the normal powder form.

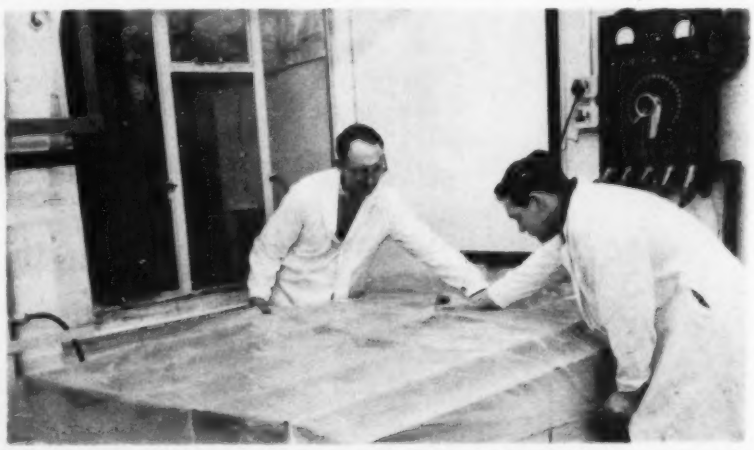
In quality and strength Nonox B Rods are exactly the same as Nonox B Powder and may be substituted for it on a weight-for-weight basis in any given application. The technical effect will be the same as when using the powder form. I.C.I. says that the only cautionary note is that, since the short rod-like granules consist of solidified resin and not of powder aggregates, they do not disperse as readily as the powder form. This is of little practical consequence except when incorporating the antioxidant on open roll mills (where the temperature may not reach the necessary softening point of Nonox B, that is, 80°C. or so) or when working with unusually soft mixes. In these cases it is necessary to make sure that uniform dispersion of the Nonox B in the mix is effected.

## More Magnesia

Chemical and Insulating Co. Ltd. of Darlington is increasing production of magnesium oxide. The company says that sales for use in neoprene compounding are expanding in Europe and the USA, as well as in the home market.

## Red-violet Pigment

A quinacridone pigment with a brilliant red-violet hue for use in automobile and other industrial finishes — which is also expected to be used in rubber and plastics — has been developed by Harmon Colors, USA, and will be marketed outside that country by Allied Chemical International.



**Adjusting the polythene cover of one of two large electro-plating vats used in the making of slush moulds. These polythene covers, made by Mondart Ltd., protect the moulds from condensation**

# Rubber Markets

## LONDON

No new development occurred. A small switching business, some arbitrage dealings with New York and a patchy consumer offtake relieved an otherwise generally dull market. Prices ranged narrowly around the 2s. a lb. level for No. 1 RSS. Minor upturns in prices were difficult to hold in face of the heavy Eastern stock position.

Latest prices are as follows:

No. 1 RSS Spot: 23¼d.-24d.

Settlement House:

March 23¾d.-23⅞d.

April/June 23¾d.-23⅞d.

July/September 23⅞d.-24d.

October/December 23⅞d.-24d.

January/March (1962) 24d.-24⅛d.

No. 1 RSS cif basis ports:

February 23⅛d.-23⅜d.

March 23¼d.-23½d.

April 23⅜d.-23⅝d.

Godown:

February 77⅛ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, February, March, 13s. 7d., cif European ports. Spot, seller, 14s. 3d. Bulk, seller, d.w. 13s. 4d. Creamed, seller, 13s. 4d. nominal, February, March. Normal, seller, February, March, 11s. 6d.

## NEW YORK

The New York rubber market ruled as under on February 6:

DEALERS' PRICES

US cents per lb., ex-dock

| | Feb. 6 | Previous |
|---|---|---|
| No. 1 RSS, Feb. .. | 28⅛n | 28⅛a |
| Mar. .. | 28¼n | 28¼a |
| No. 2 RSS, Feb. .. | 28⅛n | 28⅛a |
| Mar. .. | 28⅛n | 28⅛a |
| No. 3 RSS, Feb. .. | 28n | 28⅛a |
| Mar. .. | 27⅞n | 27⅞a |
| No. 1 RSS, Spot .. | 28⅛n | 28⅛n |
| No. 3 amber blanket crepe, Feb. .. | 23⅞n | 23⅞n |

FUTURES—REX CONTRACT

| | Feb. 6 | Prev. Close |
|---|---|---|
| March .. | 28.80b–29.05a | 28.80b–29.00a |
| May .. | 27.80b–27.95a | 28.00t |
| July .. | 27.70b–27.90a | 27.85b–28.00a |
| Sept. .. | 27.75b–27.85a | 27.85b–28.00a |
| Nov. .. | 27.70b–27.85a | 27.85b–28.00a |
| Jan. .. | 27.80b–27.85a | 27.85b–28.00a |

Sales: 35. Tone: Steady.

Slow conditions prevailed in rubber futures on February 6. Prices were about unchanged to slightly lower. The snow storm which covered much of the north-eastern part of the country and disrupted transport was partly to blame. The physical market was neglected. In late trading, futures were steady. Dealings for the day were moderate.

## SINGAPORE

The market was generally idle during the morning of February 6. Interest centred on No. 1 sheet February shipment. Lower sheets were in some demand. In the afternoon the market was steady on lack of sellers and continued interest in lower sheets, but trading was thin.

Malayan cents per lb., fob Malayan ports to open ports

| | Feb. 6 | Prev. Close |
|---|---|---|
| No. 1 RSS, Feb. .. | 78⅛–79 | 78⅛–78½ |
| Mar. .. | 79 –79¼ | 78⅛–79 |
| No. 2 RSS, Feb. .. | 78¼–78⅝ | 77⅛–78¼ |
| No. 3 RSS, Feb. .. | 77⅛–78 | 77¼–77¾ |
| No. 4 RSS, Feb. .. | 74⅛–75⅜ | 75 –76 |
| No. 5 RSS, Feb. .. | 65½–66½ | 65¼–66¼ |
| No. 1 RSS, Spot .. | 78⅛–79 | 78¼–78½ |
| No. 3 blanket thick remilled crepe, Feb. | 61½–62½ | 62 –63 |
| No. 1 fine pale crepe, Feb. .. .. | 84 –85 | 83½–84½ |
| 2x thin brown crepe, Feb. .. .. | 61½–62½ | 61 –62 |

Tendency: Steady.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 156.80d. per gallon.

## AMSTERDAM

The Amsterdam rubber market ruled as under on February 6.

Guilders per kilo

| | Feb. 6 | Previous |
|---|---|---|
| No. 1 RMA | | |
| February .. .. | 2.32½ | 2.32 |
| March .. .. | 2.33 | 2.32 |
| April .. .. | 2.33½ | 2.32 |
| May .. .. | 2.33 | 2.32 |
| June .. .. | 2.33½ | 2.32 |
| April/June .. .. | 2.33 | 2.32 |

Sales: Nil. Tendency: Very steady.

## DJAKARTA

The market closed very quiet on February 6 and there were no transactions. Prices were lower than Saturday's levels, following Singapore advices.

Rupiahs per kilo

| | Feb. 6 | Previous |
|---|---|---|
| Spot No. 1 Priok .. | 29.50b | 30.00b |
| Spot No. 2 Priok .. | 28.50b | 29.00b |
| Spot No. 3 Priok .. | 27.50b | 28.00b |
| No. 1 fine pale crepe, spot .. .. .. | 28.25b | 28.50b |

## CEYLON

The price of No. 1 RSS at Colombo on February 6 was 85 (86) Ceylon cents per lb.

## BANGKOK

The price of No. 1 RSS at Bangkok on February 6 was 25.75 (26.00) US cents per lb.

## Trade Visit to Iraq

A small party of British businessmen and industrialists, which has been organized jointly by the Advisory Council on Middle East Trade and the Federation of British Industries, returned from Iraq yesterday (February 10). The party included A. E. Durling (Dunlop).

The purpose of the visit was to renew and strengthen trading contacts in Iraq; examine the prospects of increasing trade between the UK and Iraq, and assist in the development of the Iraqi economy.

## Safety on Construction Sites

The Minister of Labour has appointed G. G. Honeyman, Q.C., as commissioner to hear objections to the Construction (General Provisions) Regulations, and the Construction (Lifting Operations) Regulations which were published in draft form last October. These regulations deal with safety requirements on construction sites.

The inquiry, which will be in public, will be opened on February 27 at 10 Carlton House Terrace, London, S.W.1.

## UK Stockpile Sales

Sales from the Board of Trade's stock of natural rubber in January totalled 280 tons. They were for delivery as follows: spot 150 tons and February delivery 130 tons; 28,405 tons of rubber remained available for sale.

## Antioxidant 2246

In the article on Chlorinated Butyl Rubber (*RJIP* January 28, 125) the chemical name of Antioxidant 2246, supplied by Anchor Chemical Company was quoted as 1,2′-methylene bis (4 methyl-6-t-butyl phenol). This should have read 2,2′ methylene bis (4 methyl-6-tertiary butyl phenol).

## Halstead Double Capacity

Extrusion plant capacity is being doubled by James Halstead Ltd., makers of PVC flooring and nosings and coverings, at Whitefield near Manchester.

## Desoutter in Moscow

On the Desoutter stand at the British Trade Fair in Moscow there will be shown a complete range of 150 Portable Pneumatic Power Tools.

# *Industry* INTELLIGENCE

## Technical Data

### Durez Resin Polishes

Durez Plastic Division of the Hooker Chemical Corporation have released a new handbook entitled 'Durez resins in polymer type floor polishes,' which contains all the latest US information on polishes and polish formulations. This handbook, samples of the resins recommended, data sheets and prices are available in the UK from Omni (London) Ltd., 35 Dover Street, London, W.1.

Extensive research has been carried out to produce new flooring compositions with which polishes must be compatible and the polish formulations given in the handbook are the result of some of the most recent research work based on producing the best balance of desirable properties with Durez resins and polymer - type materials. Forty-two formulae are given representing three Durez resins in combination with six different polymers and polymer-wax mixtures.

### Butyl HT.10-66

As announced in last week's issue of *RJIP*, Esso Petroleum Co. Ltd., 50 Stratton Street, London, W.1, is now able to supply a chlorinated butyl rubber in commercial quantities. This material, which was previously designated Chlorobutyl MD-551, is now known as Butyl HT 10-66 and has created considerable interest in the US in a wide range of applications. Advantages claimed for the product, in addition to those exhibited by conventional butyl grades, include exceptional heat resistance, wider choice of cure systems, increased cure rate and compatibility with other elastomers.

A Technical Bulletin will shortly be available from Esso dealing with this new polymer. Details are given of the vulcanization systems possible, vulcanizate properties, compounding and processing and applications. These are numerous and range from tubeless tyre inner liners and non-toxic compounds for food containers, to high temperature steam hose, conveyor belting and various moulded and extruded items.

### Polystyrene Monofilament

A new grade of Shalon polystyrene monofilament has been developed by Bakelite Ltd., 12-18 Grosvenor Gardens, London, S.W.1, from whom copies of Advance Information Sheet S.11, giving full details, are available.

Designated DBA 205, the material is produced in a diameter of 0.040in. and is an addition to the existing range of filling materials suitable for scavenger, agricultural and other forms of heavy duty brushware. Available in 4in. to 14in. lengths in 1in. increments, advantages over natural vegetable fibres claimed for the new material include superior wearing characteristics, minimum electrostatic pick-up, negligible trimming losses and good mechanical properties which are not affected by storage. Shalon DBA 205 can be pan set, heat welded or stapled and a special pitch for pan setting is available from Berry Wiggins and Co. Ltd.

## Machines, Materials and Equipment

### Sealing Liquid Sachets

A simple attachment for use with the Acme range of VHF plastics welding machines allows these to be used for the packing and sealing of liquid sachets. After a length of tubing has been filled with liquid it is indexed by hand into a simple metering section which prevents excess liquid being trapped in the sachet, this action taking place when the electrode is brought into position for the seal. The weld takes place and the tube is indexed for the next weld. Very high speeds are obtained up to 2,000 an hour and the jigs and fixtures can be set up in the matter of only a few minutes. Further details are available from HF Industrial Services Ltd., 317-319 High Road, Wood Green, London, N.22.

### Non-Slip Roller Covering

A new fabric has been developed primarily as a covering for take up rollers, driving drums, and measuring wheels, in which reliable contact without slipping is of importance. This is manufactured by Tannoid Ltd., Church Row Works, Wandsworth Plain, London, S.W.18.

The material is based on a non-stretch glass fibre fabric having high tensile strength and resistance to wear. It has a permanently tacky surface which ensures a non-slip contact, and this property is unimpaired by cleaning with solvents, or by temperatures up to 150°F.

Rollers may be covered by a layer of the material ⅛in. thick bonded by an adhesive or by mechanical means. For lighter application, tapes based on nylon or terylene, with a thickness of 0.020in. are available.

### Hot Water Circulator

A variety of equipment is available for maintaining laboratory water baths at constant temperatures; a new instrument of larger capacity has been developed by Churchill Instrument Co. Ltd., Walmgate Road, Perivale, Greenford, Middlesex, for laboratory and industrial use. It is suitable for the circulation of water at accurately controlled temperatures up to 95°C. to water jackets, heat transfer systems, injection moulds, etc.

A single compact unit contains an electric immersion heater in a cast finned tube, a glandless hot water circulating pump, and a Cambridge temperature controller.

Rapid response to the controls is obtained; heating is effected rapidly because of the low water capacity of the heating tube, and cooling by admission of cold water by a solenoid operated valve.

The equipment is easily mounted on a pair of fixing brackets, is self contained, and needs very little maintenance.

### Reversing Vehicle Warning

A device which automatically sounds an audible warning when a vehicle is moving in reverse should be of great value in protecting bystanders from accidents. Such a device has been invented by an engineer of the Dunlop Rubber Company for incorporation into the rear wheels of all company vehicles.

The device consists simply of a flat disc of moulded synthetic rubber and a central bronze gong. Radial grooves in the rubber disc each contain a steel ball, and the grooves are so shaped that in forward motion the balls remain at their outer ends, but as soon as the wheel begins to turn in reverse, they fall one by one on to the gong, so giving a loud warning.

## Publications

### Packaging

The increasing use of plastics materials in the packaging of commercial and industrial products is dealt with in a new 20-page booklet just published by the plastics division of Eastman Chemical Products Inc., Kingsport, Tennessee.

'Packaging — Last Step in Manufacture, First Step in Sales,' is the fourth in a series of booklets on the use of Eastman products and discusses the spectacular growth of plastics in packaging. Topics described in the booklet include flexible film for wrapping, plastic coatings and laminations, blister and bubble packs, containers and closures and squeeze bottles.

Also presented are details of chill-roll extrusion, the use of colour and an illustrated description of various methods employed in imprinting on transparent film.

# Future Events

### Institution of the Rubber Industry

*Leicester Section.*—Feb. 17 at the Royal Hotel, Leicester, at 7.30 p.m. 'The Organization of a Technical Department,' by J. A. Hardman, M.Sc. (BTR Industries Ltd.).

*London Section.* — Feb. 14 at the National College of Rubber Technology, Holloway, London, N.7, at 5.30 p.m. 'Technological Aspects of Rubber to Metal Bonding,' by Dr W. D. Rae (Andre Rubber Co. Ltd.). At 7 p.m., 'Research Topics,' led by College Research Personnel.

*Manchester Section.* — Feb. 13 at Newton Heath Technical College, Manchester, at 6.45 p.m. 'Tyres and the Modern Car,' by E. S. Tompkins, B.Sc., A.I.R.I. (Dunlop Rubber Co. Ltd.).

*Merseyside Section.*—Feb. 13, at the Exchange Hotel, Liverpool, at 7.30 p.m. 'Direct Moulded Footwear,' by J. G. Butlin, B.Sc., A.I.P., A.R.T.C.S. (S.A.T.R.A.).

*Midland Section.*—Feb. 13, at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6.45 p.m. 'Investigation of the Ageing of Rubber Vulcanizates by Stress Relaxation Methods,' by Dr J. Scanlan (RABRM).

*Preston Section.*—Feb. 13 at BTR Industries Social Club, Farington, Preston, at 7.15 p.m. 'An Accountant Will Talk (2),' by P. A. Land (BTR Industries Ltd.).

*Scottish Section.*—Feb. 14, at the North British Hotel, Princes Street, Edinburgh, at 7.30 p.m. 'The Chemical Resistance of Rubber and Plastics,' a joint meeting with the Plastics Institute, and led by B. J. Habgood, B.Sc., A.R.I.C., F.I.R.I. (I.C.I. Ltd.).

Feb. 17, a smoking concert at the Ivy Restaurant with the Plastics Institute.

### Plastics Institute

*Midlands Section.*—Feb. 17, at the James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 6.30 p.m. 'Toolmaking Methods and Materials,' by J. P. Fox, B.Sc., M.I.Mech.E. (Fox and Offord Ltd.).

*North-Eastern Section.*—Feb. 15, at the Eldon Grill, Grey Street, Newcastle-upon-Tyne, at 7 p.m. 'Impressions from America,' by C. T. Graham, B.Eng., A.M.I.E.E., F.P.I. (The Bushing Co. Ltd.).

*Scottish Section.*—Feb. 17 a smoking concert at the Ivy Restaurant with the IRI Scottish Section. Feb. 14, see above.

*Western Section.* — Feb. 15 at Gloucester Technical College, at 7 p.m. 'Mould Manufacturing Methods to Meet Present-day Needs of the Plastics Industry,' by C. R. Sankey (BIP Tools Ltd.).

## Latest Wills

**Mr William Jacks Thomson,** of Fernleigh Road, Newlands, Glasgow, formerly chairman of the Acre Rubber Co. Ltd., who died on September 24, left personal estate in England and Scotland valued at £4,443.

## TRADE MARKS

*Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.*

CIBAPHASOL (811,495) Chemical products for use in the textile, leather, paper and plastics industries. Ciba Ltd. (a joint stock company organised under the laws of Switzerland), 141 Klybeckstrasse, Basle, Switzerland. (Class 1; January 18 1961.) Address for service is c/o Abel and Imray, Quality Court, Chancery Lane, London, W.C.2.

DIOSACKS (807,437) Containers included in Class 16 in the nature of sacks. The Metal Box Co. Ltd., 37 Baker Street, London, W.1. (Class 16; January 18 1961.)

DIXOPAK (809,280) Plastics in sheet form included in Class 17. Peter Dixon and Son Ltd., 11 New Fetter Lane, London, E.C.4. (Class 17; January 18 1961.)

VERALENE (800,817) Piece goods made of plastics of the kind used for making up into articles commonly made of fibrous textiles. Harold George Limmer, trading as Southend Plastic Works, 449 London Road, Southend-on-Sea. (Class 24; January 18 1961.)

TILLOCELL (810,296) Wrapping and packaging materials made of plastics or of wood pulp. Tillotsons Mouldings Ltd., Orrell Lane, Burscough, County of Lancaster. (Class 16; January 25 1961.)

TILLOTHENE (810,298) Wrapping and packaging materials made of plastics or of wood pulp. Tillotsons Mouldings Ltd., Orrell Lane, Burscough, County of Lancaster. (Class 16; January 25 1961.)

## Increases of Capital

**R. and A. G. Crossland Ltd.** (458,653).—Metal and plastic goods manufacturers, etc., Cartbridge Lane, Walsall, Staffs. Increased on May 24 1960, by £50,000 in 1s. ordinary shares, beyond the registered capital of £150,000.

**St. George Rubber Holdings Ltd.** (661,944), 16 Philpot Lane, E.C.3. — Increased on June 22 1960, by £99,900 in 2s. ordinary shares, beyond the registered capital of £100. Converted into a 'public' company on June 22 1960.

**Mark Anthony & Sons Ltd.** (548,421).—Manufacturers of polythene materials, etc., 35-37 Maddox Street, W.1. Increased on January 7 1960, by £9,900 in £1 ordinary shares, beyond the registered capital of £100.

**Malayalam Plantations Ltd.** (175,706).—Rubber, coffee, tea, etc., 1/4 Great Tower Street, E.C.3. Increased on April 11 1960, by £2,000,000 in 2s. shares, beyond the registered capital of £2,000,000.

**United Glass (Thermoplastics) Ltd.** (639,268). — Leicester House Leicester Square, W.C.2. Increased on May 20 1960, by £249,500 in £1 ordinary shares, beyond the registered capital of £500.

**Doranakande Rubber Estates Ltd.** (258,145).—Adelaide House, London Bridge, E.C.4. Increased on June 2 1960, by £90,000 in 2s. shares, beyond the registered capital of £60,000.

**Kampong Kuantan Rubber Co. Ltd.** (101,188). — 73/75 Mortimer Street, W.1. Increased on April 29 1960, by £320,000 in 1,269,000 ordinary and 1,931,000 unclassified shares of 2s. each, beyond the registered capital of £180,000.

## Changes of Name

**London and Midland Distributors Ltd.** (448,081), plastic goods, etc., 3 Burnt Oak Broadway, Edgware, Middlesex. — Name changed to L.M.D. (Wholesale) Ltd. on July 13 1960.

**Rotex Plastics Ltd.** (522,485), Kildare Close, Eastcote, Ruislip, Middlesex. — Name changed to Weldex Plastics Ltd. on July 7 1960.

**Yardley Hastings (Fashions) Ltd.** (518,906), 35 Leconfield Road, N.5.—Name changed to Plastics Fabrication and Printing Ltd. on June 30 1960.

**Rubber and Industrial Trust Ltd.** (179,145), 66 Gresham Street, E.C.2.—Name changed to Sterling and Overseas Investments Ltd. on June 21 1960.

## NEW COMPANIES

**Nickerson Bros. Ltd.** (179,217).—December 20. Capital: £7,000 in £1 shares. To acquire the business carried on at Worship Street, E.C.2, as Nickerson Bros. Ltd.; carry on the business of manufacturers of and dealers in hides, skins, rubber goods, etc. The first directors are: George W. Nickerson, 8 Cordach Avenue, Wallington, Surrey; Henry E. Nickerson, 36 Coniston Road, King's Langley, Herts.; Albert L. Nickerson, 25 Glebelands Avenue, E.18. Regd. office: 99/101 Worship Street, E.C.2.

**Essex Plastics Co. Ltd.** (679,336).—January 2. Capital: £2,000 in £1 shares. To carry on the business of yacht, boat and ship builders, manufacturers, moulders and workers in fibre glass, reinforced and plastic materials and substances, etc. The first directors are: John Grisley and Lucy M. Grisley, both of 15 Woodfield Gardens, Leigh-on-Sea; Kenneth M. Grisley, James A. Grisley and Douglas A. Clements. Regd. office: 9 Harley Street, W.1.

**Reeves, Maslen and Hinxman Ltd.** (679,770).—January 5. Capital: £1,000 in £1 shares. To carry on the business of hardwood, plywood and plastic merchants, etc. The first directors are Arthur H. Reeves, Peter C. White, Kenneth C. Marsh, Steven J. Crowder, Frederick G. Kays, William M. L. Penny, Maurice J. Jackman. Regd. office: 7 The Plains, Totnes, Devon.

**Schoplast Products Ltd.** (679,869). — January 6. Capital: £15,000 in £1 shares. To carry on the business of manufacturers of and dealers in insulating packaging and display materials, thermal and acoustic equipment, etc. The first directors are: Margut Schofield, Patrick W. Dawson. Regd. office: Newtown Mill, Cow Lane, Burnley.

**Telcon Plastics Ltd.** (679,598).—January 4. Capital: £100 in £1 shares. To construct, lay down, erect, maintain, repair and work submarine and land cables, telegraphs, telephones and wireless installations, etc. The first directors are: Derek Norman-Thomas, William C. Smith, Harold F. Wilson. Regd. office: Norfolk House, Norfolk Street, W.C.2.

**P.D.M. Engineering Co. Ltd.** (681,177).—January 20. Capital: £1,000 in £1 shares. To carry on the business of toolmakers, mechanical, hydraulic, pneumatic, electrical, motor and general engineers, processors of plastic substances and materials, etc. The directors are: Terence J. Brown and Margaret J. Brown, both of 12 Benets Road, Hornchurch, Essex (directors of Pee Dee Mouldings Ltd.). Regd. office: 156 Front Lane, Cranham, Essex.

**Crabtree Engineers (Rochdale) Ltd.** (681,215).—January 20. Capital: £10,000 in £1 shares. To acquire the business of light engineers and plastic moulders carried on by S. H. Crabtree at Rochdale, etc. The directors are: Stanley H. Crabtree and Mrs. Olive L. L. Crabtree, both

**At the Bridgwater factory of Bonded Fibre Fabric Ltd., the fibres from which Solena bonded fabrics are made have been processed to form a web which is impregnated with synthetic rubber latex. Here, the fabric is being rolled up and is ready for use as interlining by the clothing trade**

of Stubley Old Hall, Littleborough; George T. Etheridge, 5 Cambridge Avenue, Rochdale. Regd. office: Mellor Street Works, Mellor Street, Rochdale.

**Castle Tyre Services Ltd.** (680,410). — January 12. Capital: £4,000 in £1 shares. The subscribers (each with one share) are: William P. Manning, Gordon A. Bruce. The first directors are to be appointed by the subscribers. Regd. office: Castle Lane, Bedford.

**Sidard Creations Ltd.** (680,332). — January 11. Capital: £500 in £1 shares. To carry on the business of manufacturers, moulders, extruders and fabricators of all kinds of plastic materials, etc. The first directors are: Sidney B. Westwell, Gerard W. Hulse. Regd. office: 171/175 Price Street, Birkenhead.

**Modak Ltd.** (680,385). — January 12. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in thermosetting materials, laminates, castings and other structural forms, and allied thermoplastic goods, etc. The directors are: Alfred S. Moore, Gordon E. Davies, Archibald W. Kempster. Regd. office: 9 Manchester Street, Luton.

**Norbid Plastics Ltd.** (680,272).—January 11. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, etc. The subscribers (each with one share) are: Laurence R. Battell, 117 Hart Road, Thundersley, Essex; William J. Wildman, 64 Woodside Avenue, N.12. The first directors are to be appointed by the subscribers.

**Orndee Plastics Ltd.** (680,277).—January 11. Capital: £100 in £1 shares. Other particulars are similar to Norbid Plastics Ltd. (q.v.).

**Ornend Plastics Ltd.** (680,279).—January 11. Capital: £100 in £1 shares. Other particulars are similar to Norbid Plastics Ltd. (q.v.).

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**Cindy Engineering (Plastics) Ltd.** (680,069).—January 9. Capital: £200 in 2s. 6d. shares. The directors are: Charles G. Forshaw and Phyllis B. Forshaw, Adrian G. Forshaw. Regd. office: 3 Merrilocks Road, Blundellsands, Liverpool, 23.

**General Moulding Co. Ltd.** (680,954).—January 18. Capital: £1,000 in £1 shares. To carry on the business of manufacturing, moulding and dealing in plastics, etc. The directors are: Maurice A. Hentall, 33 Rose Walk, St. Albans; Arthur E. Scott, 22 Brodie Road, E.4. Regd. office: 158 Bishopgate, E.C.2.

**Elonite Laminated Plastics Ltd.** (680,997). —January 18. Capital: £100 in £1 shares. The subscribers (each with one share) are: William A. Payne, Stanley Winograd. Payne is the first director. Regd. office: 77 Portland Place, W.1.

## County Court Judgments

*NOTE.—These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry if satisfied in Court Books within twenty-one days.*

**Southern Plastics (Portsmouth) Ltd.**, 30-32 Lower Forbury Road, Southsea, Hants. Edmonton, £15, September 2 1960.

**Virex Plastics Ltd.**, 26c Brighton Road, Birkdale, Southport, Lancs. Westminster, £20, October 20 1960.

**C. R. Plastics**, 110 Marlborough Road, London, N.19. Luton, £308 10s. 3d., October 25 1960.

**Plasticork Flooring Co. Ltd.**, R/o 13 Queensthorpe Road, Sydenham, London, S.E.26. Bloomsbury, £32 17s. 9d., November 1 1960.

**Leonard Francis Hurle (T/A Plastic Utilities)**, 1a Shepherds Bush Road, W.6, London, plastic, fancy goods manufacturers. Westminster, £52 18s., October 31 1960.

**Ilfor Lloyd Williams**, 634 Harrow Road, London, W.10. Bloomsbury, £64 12s., October 24 1960.

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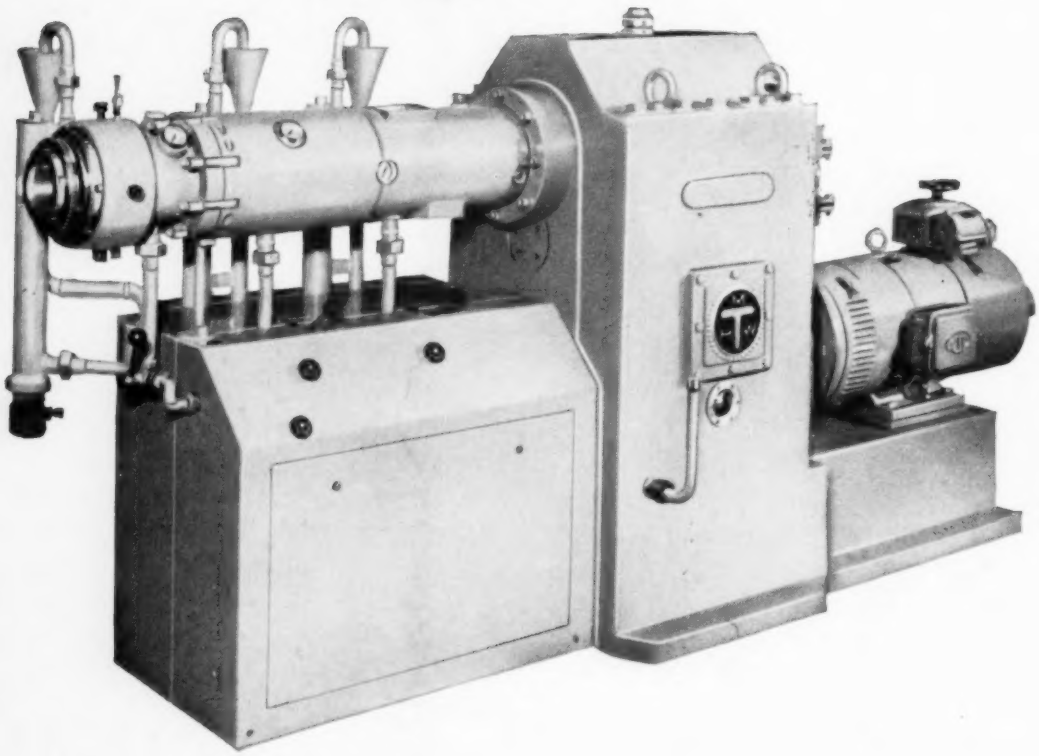

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